



Northeastern University  
Library















# PROCEEDINGS

OF THE

AMERICAN SOCIETY

OF

# CIVIL ENGINEERS.

(INSTITUTED 1852.)

---

VOL. XVII.

JANUARY TO DECEMBER, 1891.

---

NEW YORK:

PUBLISHED BY THE SOCIETY.

---

1891.

Entered according to Act of Congress, by the AMERICAN SOCIETY OF CIVIL ENGINEERS, in  
the Office of the Librarian of Congress at Washington.

NOTE.- This Society is not responsible, as a body, for the facts and opinions advanced in  
any of its publications.



# INDEX.

## ABBOT.

- ABBOT, FREDERICK WILLIAM.—Admitted as Associate Member, 263.  
 ABBOTT, JOB.—Admitted as Member, 167.  
 Abbreviation for Associate Member changed, 276.  
 ACKENHEIL, CHARLES.—Memoir of, 137.  
 ADAMS, EDWARD DEAN.—Admitted as Fellow, 168.  
 Additions to Library and Museum, 129, 141, 165, 170, 213, 238, 246, 254, 261, 272, 281, 293.  
 "Advantages of a Longitudinal Bearing System for Railway Tracks," by T. C. CLARKE, read and discussed, 198.  
 ALLEN, HENRY CLAYTON.—Admitted as Associate, 239.  
 ALLEN, THEODORE.—Memoir of, 240.  
 ALLEN, WILLIAM ALBERT.—Admitted as Member, 173.  
 AMBROSE, W. C.—Paper by, 131.  
 "American Irrigation Engineering," by HERBERT M. WILSON, read and discussed, 198.  
 American Society of Mechanical Engineers, letter from, 276.  
 ANDERSON, JAMES CHRIS.—Admitted as Junior, 258.  
 ANDERSON, LATHAM.—Paper by, 201.  
 ARENTZ, FREDERICK CHRISTIAN HOLBERG.—Admitted as Associate, 173.  
 Article IX on Local Associations declared not adopted, 144.  
 ATKINSON, JOHN B.—Discussion by, 263.  
 ATWOOD, WILLIAM HENRY.—Memoir of, 203.  
 BALDWIN, WARD.—Paper by, 199.  
 BARLOW, LT. COL. J. W.—Presents Album, 215.  
 BASCOMB, WESTERN RADFORD.—Admitted as Junior, 284.  
 BASSETT, CARROLL PH.—Paper by, 168.  
 BEARD, ELMER HARRY.—Admitted as Junior, 258.  
 BEARDSLEY, ARTHUR.—Admitted as Member, 257.  
 BELKNAP, WILLIAM ETHELRED.—Admitted as Junior, 167.

## BENSEL.

- BENSEL, JOHN ANDERSON.—Admitted as Member, 143.  
 BERG, LOUIS DE COPPET.—Admitted as Member, 257.  
 BERRALL, JAMES.—Admitted as Junior, 173.  
 BEUGLER, EDWIN JAMES.—Admitted as Junior, 216.  
 BISSEL, FRANK EDWARD.—Admitted as Member, 257.  
 BLAKELEY, G. H.—Discussion by, 284.  
 BLUNT, ROBERT ALLAN.—Admitted as Junior, 258.  
 Board of Censors to Award the Norman Medal, Report of, 2.  
 Board of Direction.—Annual Report, 1, 82.  
 BOGART, JOHN.—Elected as Treasurer, 65.  
 —vote of thanks to, 78.  
 BOLLER, A. P., Jr.—Paper by, 276.  
 —Discussion by, 276.  
 BOLTON, CHANNING M.—Letter from, 289.  
 Book Notices, 140, 237, 262, 273.  
 BOOKER, BERNARD FRANK.—Admitted as Member, 215.  
 BOTH, CARL CHRISTIAN ADOLPH.—Admitted as Member, 257.  
 BOUSCAREN, LOUIS G. F.—On Committee to Prepare Business, 174.  
 BRADLEY, CHARLES WHITING.—Admitted as Associate, 216.  
 "Brazos River and Harbor Improvement," by GEO. Y. WISNER, read and discussed, 258.  
 BREITHAUP, W. H.—Discussion by, 276, 284.  
 BRENDLINGER, P. F.—On Nominating Committee, 190.  
 BROWNE, ARCHIBALD ROBERTSON.—Admitted as Junior, 284.  
 BROWN, CHARLES IRWIN.—Admitted as Member, 1.  
 BRUSH, CHARLES B.—Elected as Director, 65; Presides at Meeting, 131, 283; On Committee on Finance, 132; On Committee to Prepare Business, 174; Discussion by, 264.  
 BUCK, L. L.—Discussion by, 276.  
 BURR, EDWARD.—Admitted as Member, 173.

356523

## CAPLES.

## COMMITTEE.

- CAPLES, MARTIN JOSEPH.—Admitted as Associate Member, 275.
- CARLL, DAVID SYLVANUS.—Admitted as Associate, 239.
- CARROLL, EUGENE.—Admitted as Associate, 239.
- CARTER, O. M.—Paper by, 263.
- CASE, L. N.—Discussion by, 276.
- CATTELL, WILLIAM ASHBURNER.—Admitted as Associate, 173.
- "Cement Testing."—Discussion on, 216.
- CHANUTE, OCTAVE.—Elected as President, 65; On Committee to Prepare Business, 174; Presides at Meeting, 173, 174, 197, 198, 199, 284; Letter from, 276.
- "Characteristics of the Ravine du Sud, in the Island of Hayti, and Plan for Averting its Overflow," by J. FOSTER CROWELL, 168.
- "Cheap Covered Reservoir," by ARTHUR D. FOOTE, read, 216.
- CHIBAS, EDUARDO JUSTO.—Admitted as Junior, 167.
- "Chignecto Ship Canal," described by J. F. O'Rourke, 79.
- CHURCH, GEORGE EARL.—Appointed Delegate to International Congress of Hygiene and Demography, 240.
- CLARKE, THOMAS C.—Paper by, 198; Presides at Meeting, 257; Discussion by, 258, 284.
- CLAPP, GEORGE HUBBARD.—Admitted as Associate, 239.
- COCHRAN, A. P.—Death announced, 275.
- "Coffer-Dam or Caisson without Timber or Iron in its Construction," by ROBERT L. HARRIS, read and discussed, 144.
- COHEN, MENDES.—Nominated as President, 265.
- COLLINGWOOD, FRANCIS.—Elected as Secretary, 65; On Committee on Library, 132; On Committee to Prepare Business, 174; Discussion by, 264.
- "Colorado Automatic Refrigerator System at Denver, Col.," by A. McCL. HAWKS, read, and discussed, 168.
- Columbian Exposition, Engineering headquarters at, 276.
- COMFORT, SILAS GILDERSLEEVE.—Admitted as Associate, 167.
- Committee to Award the Rowland Prize, Report of, 2.

- Committee on Compression of Cements and Settlement of Masonry, 72.
- on Impurities of Domestic Water Supplies, 73, 121, 195.
- on an International Engineering Congress, 75, 124, 168.
- on Nominations, 190.
- on Revision of the Constitution and By-Laws, 2-64.
- on Standard Rail Sections, 73, 196.
- on Structural Materials, 190.
- on Uniform Methods for Tests of Materials used in Metallic Structures, 72.
- on Uniform Standard Time, 66, 69, 92.
- on Units of Measurement, 69, 195.
- "Concrete Beams Reinforced by Twisted Iron for Floor Construction," by ERNEST L. RANSOME, read, 258.
- CONNOR, ADDISON.—Death announced, 1.
- CONOVER, N. J.—Paper by, 131.
- Constitution canvassed and declared adopted, 143.
- Constitution of the Society, adopted March 4, 1891, 146.
- COMER, HARRY.—Admitted as Associate, 173.
- CROWELL, J. FOSTER.—Paper by, 168.
- CUNNINGHAM, ANDREW CHASE.—Admitted as Associate Member, 257.
- CUSHING, WILLIAM CHANNING.—Admitted as Associate Member, 275.
- CUTSHAW, WILFRED EMORY.—Admitted as Member, 143.
- DANFORTH, FREDERICK.—Admitted as Member, 257.
- DE COURCY, B. W.—Paper by, 201.
- "Description of the Concrete Sewer at Mount Vernon, N. Y.," by WM. E. WORTHEN, read and discussed, 168.
- DILLMAN, GEORGE LINCOLN.—Admitted as Member, 143.
- "Discussion of Paper No. 444, Reducing Internal Wastes of the Steam Engine," by ROBERT H. THURSTON, read by title, 201.
- DIVEN, JOHN M.—Admitted as Associate, 258.
- DORSEY, E. BATES.—Paper by, 198.
- DUANE, JAMES.—Paper by, 284.
- DU BOIS, A. J.—Discussion by, 284.
- DUNN, DANIEL BURKE.—Admitted as Member, 283.



## DUNN.

- DUNN, EMMETT CLARKE.—Admitted as Associate Member, 275.
- DUNN, JAMES RANDALL.—Admitted as Associate, 167.
- EARL, GEORGE GOODELL.—Admitted as Associate Member, 283.
- EASBY, MARMADUKE WARD.—Admitted as Associate Member, 275.
- ELWELL, CHARLES CLEMENT.—Admitted as Member, 239.
- EMERY, CHARLES E.—Discussion by, 263.
- “Engineering around Chattanooga,” by W. R. KING, 221.
- ERLANDSEN, OSCAR.—Admitted as Associate Member, 283.
- ERNST, O. H.—Discussion by, 258.
- “Experimental Determination of the Rolling Friction in operating the Draw of the Thames River Bridge,” by A. P. BOLLER, Jr., and H. J. SCHUMACHER, read and discussed, 276.
- FAIRLEIGH, JAMES ANDREW.—Admitted as Member, 257.
- FARLEY, JOHN MOYER.—Admitted as Associate, 239.
- FARNUM, HENRY HARRISON.—Admitted as Member, 239.
- FARRINGTON, HARVEY.—Admitted as Junior, 216.
- FELTON, H. C.—Discussion by, 263.
- FIELD, GEORGE S.—On Nominating Committee, 190.
- FITZGERALD, DESMOND.—Paper by, 201.
- FITZHUGH, GEORGE DOWMAN.—Admitted as Member, 173.
- FLYNN, PATRICK JOHN.—Admitted as Member, 131.
- FOGG, CHARLES E.—Death announced, 257; memoir of, 230.
- FOOTE, ARTHUR D.—Paper by, 216.
- FORT, Colonel.—Address at Annual Convention, 217.
- FOUQUET, LOUIS DOUGLAS.—Admitted as Junior, 1.
- FREANE, HARRY.—Admitted as Associate, 173.
- FREEMAN, JOHN R.—Paper by, 131, 145.
- “Free Railway Construction vs. Government Controlled and Owned Railroads,” by E. BATES DORSEY, read and discussed, 198.
- FREYHOLD, FELIX.—Admitted as Associate Member, 257.
- FRELEY, ALPHONSE.—Elected as Vice-President, 65; presides at Meeting, 131, 143, 144, 215, 258, 263, 275, 276.

## GAHAGAN.

- GAHAGAN, WALTER H.—Admitted as Associate, 239.
- GAMBLE, FRANCIS CLARKE.—Admitted as Member, 167.
- GARDNER, MARTIN LUTHER.—Admitted as Associate Member, 257.
- GAY, CHARLES WEBSTER.—Admitted as Member, 173.
- “Geology and Topography of Look-out Mountain and the Region About,” by Professor J. M. SPORFORD, 198.
- GIFFORD, GEORGE EDWIN.—Admitted as Associate Member, 263.
- GILES, ROBERT.—Admitted as Member, 173.
- GILLETTE, Jr., E.—Paper by, 201.
- GOODELL, JOHN MILTON.—Admitted as Associate, 240.
- GOODWIN, JOHN MARSTON.—Memoir of, 267; death announced, 275.
- GOULD, E. SHERMAN.—Discussion by, 264, 275.
- GRAFF, FREDERIC.—Memoir of, 247.
- GRANT, THOMAS HENRY.—Admitted as Associate, 173.
- GRANT, WILLIAM H.—Paper by, 201; discussion by, 216.
- GREINER, JOHN E.—Paper by, 198.
- GRIFFIN, P. H.—Paper by, 200.
- GUPPY, BENJAMIN WILDER.—Admitted as Junior, 216.
- HAINES, CASPAR WISTAR.—Admitted as Member, 263; letter from, 289.
- HALE, RICHARD AUGUSTUS.—Admitted as Member, 239.
- HALL, JULIEN A.—Paper by, 173.
- HARING, JAMES SMITH.—Admitted as Member, 275.
- HARRIS, ROBERT L.—Paper by, 144.
- HARROLD, THOMAS.—Admitted as Junior, 284.
- HASKELL, CHARLES FRED. BEALS.—Admitted as Member, 263.
- HASKINS, WILLIAM J.—On Committee for Annual Meeting, 284.
- HASWELL, CHARLES H.—Discussion by, 263.
- HAUPT, L. M.—Discussion by, 264.
- HAWKS, A. McL.—Paper by, 168.
- HAWKSHAW, Sir JOHN.—Death announced, 257; Memoir of, 250.
- HAZLETON, CHARLES WILLIAM.—Admitted as Member, 1.
- HEALY, JOHN FRANCIS.—Admitted as Associate, 215.
- HENTHORN, JOHN T.—Paper by, 201.
- HERING, RUDOLPH.—Elected as Director, 65; On Committee on Library, 132; discussion by, 276.

## HERMANY.

- HERMANY, CHARLES.—Elected as Vice-President, 65.
- HERSCHEL, CLEMENS.—Elected as Director, 65; On Committee on Finance, 132.
- HILGARD, JULIUS E.—Death announced, 215.
- HILL, WILLIAM RYAN.—Admitted as Member, 239.
- HILLS, FRANCIS LOWELL.—Admitted as Member, 143.
- "Howe Strut Problem," by N. J. CONOVER, presented, 131, and read by title.
- HUMPHREY, WILLIAM SHELDON.—Admitted as Associate Member, 257.
- HUNT, CHARLES WARREN.—On Committee for Annual Meeting, 284.
- HUNT, CONWAY BETHUNE.—Admitted as Member, 131.
- HUTCHINSON, GEORGE HUNT.—Admitted as Associate Member, 257.
- HUTTON, WILLIAM R.—Discussion by, 258.
- "Hydraulics of the Hemlock Lake Conduit of the Rochester Water Works," by GEORGE W. RAFTER, read and discussed, 264, 275, 276.
- "Influence of Curvature and Elevation of Tracks on the Stresses in Bridges," by WARD BALDWIN, read, 199.
- "Inland Sewage Disposal, with Special Reference to the Work at East Orange, N. J.," by CAROL PH. BASSETT, read and discussed, 168.
- International Congress of Hygiene and Demography, Delegates Appointed, 240.
- JACKMAN, HOWARD HILL.—Admitted as Member, 173.
- JACKSON, THOMAS MOORE.—Admitted as Member, 215.
- JANNEY, WILLIAM DEAN.—Admitted as Associate, 173.
- JARDINE, A. WILLIAM, presents drawings of Jetty Head at Torres Straits, 215.
- JENCKES, LAWRENCE BATES.—Admitted as Junior, 167.
- JEWETT, WILLIAM BRADFORD.—Admitted as Junior, 258.
- JOHNSON, JAMES MORELAND.—Admitted as Member, 239.
- JOHNSON, PHELPS.—Admitted as Member, 239.
- JORDAN, WILLIAM FREDERICK.—Admitted as Associate, 167.

## JUST.

- JUST, GEORGE ALEXANDER.—Admitted as Member, 143.
- KHVEN, RICHARD, Jr.—Admitted as Junior, 284.
- KIMBALL, GEORGE ALBERT.—Admitted as Member, 239.
- KING, CHARLES CYRUS.—Admitted as Member, 257.
- KING, HENRY WHELOCK.—Admitted as Associate, 216.
- KING, Col. WILLIAM R.—Address by, 198; Address at Annual Convention, 221.
- KNIGHT, WILLIAM BAKER.—Memoir of, 277.
- KUICHLING, EMIL.—Discussion by, 264.
- LAMB, RICHARD.—Admitted as Associate, 173.
- LANDRETH, O. H.—On Nominating Committee, 190.
- LAWLER, JOHN.—Death announced, 144.
- LAWTON, FREDERICK BEECHER.—Admitted as Junior, 276.
- LINCOLN, W. S.—On Nominating Committee, 190.
- LOCKWOOD, JOHN.—Death announced, 284.
- "Longitudinals vs. Cross-Ties for Railway Tracks," by E. E. RUSSELL TRATMAN, read and discussed, 258.
- LUSK, JAMES LORING.—Admitted as Member, 143.
- MCCALLA, RICHARD CALVIN.—Admitted as Associate Member, 257.
- MCCONNELL, EDWARD THOMAS.—Admitted as Junior, 173.
- McFARLAND, B. W.—Admitted as Junior, 284.
- MCGUIRE, JAMES CLARK.—Admitted as Junior, 173.
- McMATH, ROBERT E.—Discussion by, 258.
- MACDONALD, CHARLES.—Discussion by, 284.
- MACY, ARTHUR.—Death announced, 257.
- MANLEY, HENRY.—On Nominating Committee, 190.
- MEAD, DANIEL WEBSTER.—Admitted as Associate, 239.
- "Measures for Restricting the Use and Waste of Water in Force in the City of Rochester," by GEORGE W. RAFTER, read and discussed, 275.

## MEMOIRS.

Memoirs of Deceased Members.—  
 OTHO ERNEST MICHAELIS, 132;  
 CHARLES ACKENHEIL, 137; FRED-  
 ERICK MERCUR, 157; WILLIAM H.  
 PAINE, 160; FREDERICK FLOYD  
 WELD, 203; WILLIAM HENRY AT-  
 WOOD, 205; SAMUEL H. MILLER,  
 208; CHARLES E. FOGG, 230; THEO-  
 DORE ALLEN, 240; RICHARD POTTS,  
 242; FREDERICK GRAFF, 247; Sir  
 JOHN HAWKSHAW, 250; JOHN MAR-  
 STON GOODWIN, 267; WILLIAM  
 BAKER KNIGHT, 277, 285.

“Mémor on Water Meters,” by JOHN  
 THOMSON, read, 199.

MERCUR, FREDERICK.—Mémor of, 157.

MERRILL, WILLIAM E.—On Nominat-  
 ing Committee, 190; Appointed  
 Alternate Delegate to Committee  
 on International Congress, 203;  
 Death announced, 284.

METCALF, WILLIAM.—On Nominating  
 Committee, 190.

MICHAELIS, OTHO ERNEST.—Mémor  
 of, 132.

MILLER, CLIFFORD NEVILLE.—Ad-  
 mitted as Junior, 258.

MILLER, SAMUEL H.—Mémor of, 203.

Minutes of Annual Convention at  
 Lookout Mountain, Tenn., May  
 21–25, 1891.

—First Session, May 21. Called to  
 order by President O. CHANUTE,  
 197; “American Irrigation En-  
 gineering,” by HERBERT M. WIL-  
 SON, read and discussed, 198.

—Second Session. May 21. “Ori-  
 gin and Evolution of the Ameri-  
 can Railroad Viaduct,” by JOHN  
 E. GREINER, read by the Secretary  
 and discussed; “Free Railway  
 Construction vs. Government  
 Controlled and Owned Rail-  
 roads,” by E. BATES DORSEY,  
 read by the Secretary and dis-  
 cussed; “Advantages of a Longi-  
 tudinal Bearing System for Rail-  
 way Tracks,” by T. C. CLARKE,  
 read and discussed; “Mountain  
 Railway Construction,” by WIL-  
 LIAM BARCLAY PARSONS, read by  
 the Secretary; “Right of Way for  
 Railroads,” by JULIEN A. HALL,  
 discussed, 198.

—Third Session. May 21. Meeting  
 called to order by Past President  
 WILLIAM P. SHINN; Address of  
 Welcome by the President of the  
 Chamber of Commerce, with re-

## MINUTES.

sponse by W. P. SHINN; address  
 on the “Geology and Topography  
 of Lookout Mountain and the  
 Region About,” by Prof. J. M.  
 SPOFFORD; historical notes by  
 XENOPHON WHEELER; engineering  
 notes, by Colonel WILLIAM R.  
 KING, U. S. A., 198.

May 21. Evening Session. Called to  
 order by Past President WILLIAM  
 P. SHINN. Address by Col. FORT,  
 President of the Chamber of  
 Commerce, Chattanooga, Tenn.,  
 217; reference by the President  
 to the plan for voting for Nomi-  
 nating Committee, 218; Address  
 by Professor SAFFORD on the To-  
 pography and Geology of the  
 Cumberland Coal Field of Ten-  
 nessee, 219; Address by the Hon.  
 XEN. WHEELER, 221; Paper on  
 “Engineering around Chatta-  
 nooga,” read, 224.

—Fourth Session. May 22. Excur-  
 sion by steamer to Shell Mound,  
 188. Annual Address of the  
 President; Lantern Slides ex-  
 hibited by H. C. HOVEY, 198.

—May 23. Afternoon Session. Dis-  
 cussion of the Report of the Com-  
 mittee on Cause of Failure of  
 South Fork Dam, 197.

—Fifth Session. May 23. “A Mémor  
 on Water Meters,” by JOHN  
 THOMSON, read; Prints and Maps  
 of the proposed Lake Erie and  
 Ohio River Ship Canal exhibited  
 by JOHN M. GOODWIN, 199.

—Sixth Session. May 25. “Influ-  
 ence of Curvature and Elevation  
 of Track on the Stresses in  
 Bridges,” by WARD BALDWIN,  
 read and discussed; resolution as  
 to entrance fees introduced, dis-  
 cussed and adopted, 199; “Sec-  
 tions and Mechanical Conditions  
 of Car Wheels,” by P. H. GRIFFIN,  
 read and discussed, 200; “The  
 Single Trap System of House  
 Drainage,” by LATHAM  
 ANDERSON, read and discussed;  
 “A Trip Through the Big Horn  
 Cañon,” by E. GILLETTE, Jr.,  
 read; “Yield of the Sudbury  
 River Water Shed in the Freshet  
 of February 10–13, 1886,” read  
 and discussed; papers read by  
 title; votes of thanks passed,  
 201. Members in attendance, 202.



## MINUTES.

Minutes of Meeting of the Board of Direction, 132, 145, 168, 203, 216, 258, 264, 276, 284.

—January 6, 1891, Applications considered; Draft of the Annual Report presented; Letters from Members declining nomination for office presented, 132.

—January 20, 1891, Draft of the Annual Report considered and approved; Report of the Treasurer presented and adopted, 132.

—January 22, 1891, Standing Committees on Finance and on Library appointed, 132.

—February 3, 1891, Applications considered; Time and place of the Annual Convention considered; "Blue List" notice ordered printed, 132.

—March 5, 1891, Duties of the Board Discussed; Preparation of Forms referred to a Committee; Time and place of the Annual Convention decided; Committee on Arrangements appointed; Rate of *Transactions* of the Society to technical institutions fixed; Secretary reports as to rate of postage on *Transactions*; The Secretary reports donation to the Library Fund; Applications considered; Applications for Associates, Juniors and Fellows ordered to lie over one month; Appropriations made, 145.

—March 31, 1891, Constitution discussed; List of Members in Arrears presented; Forms required by the Constitution approved; Delegates to represent the Society on the Committee on International Congress appointed; Applications considered; Appropriations made, 168.

—May 5, 1891, Letters in reference to new Constitution read; The Finance Committee present list of members in arrears; Alternate delegates to represent the Society on the Committee on International Congress appointed; Applications considered; Invitations to Convention ordered issued, 203.

—June 19, 1891, Resolution in reference to opening the Society House during the evening adopted; Subject of appointment of delegates to the Seventh International Con-

## MINUTES.

gress of Hygiene and Demography referred to a Committee; the Finance Committee reports recommending that the Treasurer act as Auditor for the present year; The Library Committee reports recommending that the Secretary act as Assistant Secretary and Librarian during the present year; The Secretary reports the awarding of contract for printing the *Transactions* and *Proceedings* to the Evening Post Job Printing Office; Applications considered; Appropriations made, 216.

—July 29, 1891, Consideration of the appointment of the Board of Censors to award prizes; Appointment of delegates to the International Congress of Hygiene and Demography; Application considered, 240.

—September 10, 1891, Applications considered; Printing of abstracts of papers discussed; Form of circular in reference to the Engineering Congress in Chicago in 1893 adopted; Action taken as to members in arrears; Candidates elected, 258.

—October 8, 1891, Appropriations made; Report of the Nominating Committee presented, 264; Provisions of the Constitution respecting the Eligibility of Candidates discussed; CHARLES H. MYERS nominated as Director in place of ALPHONSE FTELEY, declined; O. F. NICHOLS nominated in place of CLEMENS HERSCHEL, ineligible; Committee on Letters of Endorsement of candidate, appointed; Action taken as to Members in Arrears; Resolution respecting Evening Meetings adopted; Applications considered and candidates elected, 266.

—November 5, 1891, Letter from the American Society of Mechanical Engineers in reference to extending invitations to foreign societies to visit the Columbian Exposition presented; Letter from President CHANUTE in reference to the American Society of Civil Engineers' share of expenses of engineering headquarters presented; Treasurer BOGART reported as to

## MINUTES.

the necessary papers to be filed after the next election of officers; The question of taking books from the Library for consultation referred to the Library Committee; Abbreviation for Associate Members changed; Action taken as to Members in Arrears; Candidates elected, 276.

- December 3, 1891. The Finance Committee authorized to secure an Expert Accountant; Library Committee reported resolutions as to the use of the Library, also in reference to proposed change in the form of publications; The Secretary presented a communication from the President respecting Tests of Timber; Committee to arrange for the Annual Meeting appointed; Application considered and candidates elected, 284.

Minutes of Meetings of the Society, 1, 131, 143, 145, 166, 174, 215, 257, 263, 275, 283.

- January 21, 1891. Annual Meeting; Annual Reports of Board of Direction and Treasurer read, 1, 2; Report of Board of Censors to award the Norman Medal read, 2; Report of the Committee to award the Rowland Prize read, 2; Report of the Committee on Revision of the Constitution and By-Laws, 2; Discussion on Revision of the Constitution, 3-64; Report of the Tellers of the Ballot for Officers, 64; Report of the Committee on Uniform Standard Time, 66; Report of the Committee on Units of Measurement, 69; Report of the Committee on Compression of Cements and Settlement of Masonry, 72; Report of the Committee on Uniform Methods for Tests of Materials used in Metallic Structures, 72; Report of the Committee on Standard Rail Sections, 73; Report of the Committee on Impurities of Domestic Water Supply, 73; Report of the Committee on an International Engineering Congress, 75; Action as to Annual Convention, 76; Vote of thanks to JOHN BOGART, late Secretary, 78; "Chignecto Ship Canal," presented, 79; Visits on January 22 to Mott Haven, the

## MINUTES.

World Building, Hudson River Tunnel and Pennsylvania Railroad, 80; Reception at the Society House, 80; Members present, 80.

- February 4, 1891, Ballots canvassed; "The Use of Asphaltum in Building Sea Walls," read and discussed; "The Howe Strut Problem," read and discussed, 143.
- February 18, 1891, "The Nozzle as an Accurate Water Meter," read and discussed, 143.
- March 4, 1891, Ballots canvassed; Letter-ballot on the adoption of the New Constitution canvassed, 143; New Constitution adopted; Death of JOHN LAWLER announced; "A Coffier-Dam or Caisson without Timber or Iron in its Construction," read and discussed, 144.
- March 18, 1891, "Proportional Water Meter specially adapted to inferentially measure the total discharge of Nozzles," read and discussed; "The Nozzle as an Accurate Water Meter," discussed, 145.
- April 1, 1891, Ballots canvassed; Candidates for membership declared elected; Resolution for opening the Library adopted, 167. "Characteristics of the Ravine du Sud, in the Island of Hayti, and plan for averting its overflow," read; "A Description of the Concrete Sewer at Mount Vernon, N. Y.," read and discussed, 168.
- April 15, 1891, "The Colorado Automatic Refrigerator System at Denver, Colo.," read and discussed; "Inland Sewage Disposal, with Special Reference to the Work at East Orange, N. J.," read and discussed, 168.
- May 6, 1891, Ballots canvassed; Candidates elected; "Right of Way for Railroads," read and discussed, 173.
- May 21, 1891. Business Meeting during the Annual Convention, 174; Committee Appointed to Prepare Business, 174.
- May 23, 1891. Report of Committee on Nominating Committee, 174; Discussion on Report of Committee, 174-181; Nominations for Membership of

## MINUTES.

Nominating Committee, 181-183; Resolution of Mr. MERCALF in reference to Nominating Committee, with discussion and adoption, 184-190; Election of Nominating Committee, 190; Report of Committee on "An International Congress and Engineering Headquarters," 190-194; Progress Report of Committee on Units of Measurements, 195; Progress Report of Committee on Impurities of Domestic Water Supply, 195; Progress Report of Committee on Standard Rail Sections, 196; Progress Report of Committee on Structural Materials, 190; Report of Committee on the Cause of Failure of the South Fork Dam, 196.

—June 3, 1891, Ballots canvassed and candidates elected; Death of JULIUS E. HILGARD announced; Secretary presents Album of Views of Muscle Shoals Canal, photographs of a novel folding Bridge and drawings of jetty head at Torres Straits, 216; "A Cheap Covered Reservoir," read; discussion on "Cement Testing"; resolution in reference to next meeting, 216.

—July 1, 1891, Ballots canvassed and candidates elected, 240.

—September 2, 1891, Ballots canvassed and candidates elected; Deaths announced, 257; Action of the Board of Direction in reference to keeping the Society House open during the evening read; "Concrete Beams reinforced by Twisted Iron for Floor Construction," read; "Longitudinal vs. Cross Ties for Railway Tracks," read and discussed; "Some Experiments on the Transverse Breaking Strength of Plate Glass," read, 258.

—September 16, 1891, "The Brazos River and Harbor Improvement," read and discussed; "Characteristics of the Ravine du Sud," discussed by WM. R. HUTTON, 258.

—October 7, 1891, Ballots canvassed and candidates elected; change of character of evening meetings discussed and referred to the Board of Directors; "Screw

## MINUTES.

Steamship and Tow Barge Efficiency on the Northwestern Lakes of America," read and discussed; views of steam vessels exhibited; "Some Recent Experiments with Dynamite on an Ocean Bar," read and discussed, 263; list of advance papers presented, 264.

—October 21, 1891, "The Hydraulics of the Hemlock Lake Conduit of the Rochester Water Works," read and discussed, 264.

—November 4, 1891, Ballots canvassed and candidates elected; death of A. P. COCHRAN and JOHN M. GOODWIN announced; Secretary reported candidates elected by the Board of Direction; "The Hydraulics of the Hemlock Lake Conduit of the Rochester Water Works," read and discussed, 275; "The Measures for Restricting the Use and Waste of Water in force in the City of Rochester," read and discussed; "Modern Methods of Quarrying," read and discussed, 276.

—November 18, 1891, "The Hydraulics of the Hemlock Lake Conduit of the Rochester Water Works," discussed; "The Experimental Determination of the Rolling Friction in Operating the Draw of the Thames River Bridge," read and discussed; Secretary presented "Table of Tests of Iron Axles in the Chicago, Burlington and Quincy Railroad," 276.

—December 2, 1891, Ballots canvassed and candidates elected; death of MONCURE ROBINSON and of EDWARD WHEATON announced; "Some Disputed Points in Railway Bridge Designing," read and discussed, 284.

—December 16, 1891, Death of JOHN LOCKWOOD and of WILLIAM E. MERRILL announced; "Velocity Diagram for Clean Coated Cast Iron Water Pipes Under Pressure," presented; circular issued by the U. S. Department of Agriculture, with data and photographs, from Professor J. B. JOHNSON, on Government Timber Tests, presented; "The Red Rock Cantilever Bridge," read and discussed, 284.

MODERN.

- "Modern Methods of Quarrying," by WILLIAM L. SAUNDERS, read and discussed, 276.
- MODJESKI, RALPH.—Admitted as Associate, 239.
- MOFFETT, JAMES DAVID.—Admitted as Associate Member, 275.
- MONROE, J. ALBERT.—Death announced, 257.
- MORAN, DANIEL EDWARD.—Admitted as Associate, 215.
- MORISON, GEORGE S.—Discussion by, 263.
- MORLEY, FRED.—Admitted as Associate, 173.
- MORTON, JOHN HENRY.—Admitted as Member, 215.
- "Mountain Railroad Construction," by WILLIAM BARCLAY PARSONS, read, 198.
- Muscle Shoals Canal Album, presented, 215.
- "Neat Tests vs. Sand Tests for Portland Cement," by S. BENT RUSSELL, read by title, 201.
- Nomination of Officers, 265.
- NORTH, E. P.—Elected as Director, 65; On Committee on Library, 132; Presides at Meeting, 168, 264.
- "Notes on Cement, Mortars and Concrete," by WILLIAM H. GRANT, read by title, 201.
- "Nozzle as an Accurate Water Meter," by JOHN R. FREEMAN, discussed, 145; read and discussed, 131.
- OASTLER, WILLIAM CHURCHILL.—Admitted as Associate, 167.
- OCKERSON, JOHN A.—Discussion by, 263; Exhibits views of steam vessels, 263.
- OLDHAM, JOSEPH R.—Paper by, 263.
- "On the Construction of the Chimney for the Narragansett Electric Lighting Company," by JOHN T. HENTHORNE, read by title, 201.
- "On the Straits of Juan de Fuca, Puget Sound," by B. W. DE COURCY, read by title, 201.
- "Origin and Evolution of the American Railroad Viaduct," by JOHN E. GREINER, read and discussed, 198.
- O'ROURKE, J. F.—Paper by, 79.
- OSTRANDER, JOHN EDWIN.—Admitted as Associate Member, 257.
- OWEN, JAMES.—Discussion by, 276.

PAINE.

- PAINE, WILLIAM H.—Death announced, 1; Memoir of, 160.
- PARSONS, WILLIAM BARCLAY.—Paper by, 198.
- PEACOCK, B. F.—"Table of Tests of Iron Axles," presented, 276.
- PENNYPACKER, LEVIS PASSMORE.—Admitted as Associate, 167.
- PERKINS, THOMAS ADIE.—Admitted as Associate Member, 257.
- PHILLIPS, ASA EMORY.—Admitted as Junior, 276.
- PLYMPTON, GEORGE W.—Paper by, 258.
- PONTZEN, E.—Appointed Delegate to International Congress of Hygiene and Demography, 240.
- PORTER, ALBERT HOWELL.—Admitted as Associate, 239.
- POST, Major JAMES C.—Appointed Delegate to International Congress of Hygiene and Demography, 240.
- POTTS, RICHARD.—Death announced, 257; memoir of, 242.
- "Proportional Water Meter specially adapted to inferentially Measure the Total Discharge of Nozzles," by JOHN THOMSON, read and discussed, 145.
- QUIMBY, H. H., S. W. ROBINSON and SAMUEL M. ROWE.—Paper by, 284.
- RAFTER, GEORGE W.—Paper by, 264, 275.
- RANDENHURST, W. N.—Discussion by, 275.
- RANSOME, ERNEST L.—Paper by, 258.
- "Red Rock Cantilever Bridge," read and discussed, 284.
- REED, S. ALBERT.—Discussion by, 264.
- Revision of the Constitution and By-Laws.—Discussion on, 3-64.
- RUSSELL, S. BENT.—Paper by, 201; Discussion by, 216.
- RICHARDS, GEORGE THOMAS.—Admitted as Associate Member, 283.
- RIGGS, CLINTON LEVERING.—Admitted as Junior, 1.
- "Right of Way for Railroads," by JULIEN A. HALL; Read and discussed, 173; Discussed, 198.
- ROBINSON, MONCURE.—Death announced, 283.
- ROBINSON, S. W., SAMUEL M. ROWE and H. H. QUIMBY.—Paper by, 284.
- ROBERTS, NATHANIEL.—Admitted as Associate Member, 275.



## ROGERS.

- ROGERS, WALTER ALEXANDER.—Admitted as Junior, 258.
- ROGGE, JOHN CHARLES LEWIS.—Admitted as Junior, 167.
- ROWE, SAMUEL M., S. W. ROBINSON and H. H. QUIMBY.—Paper by, 284.
- SAFFORD, PROFESSOR.—Address at Annual Convention, 219.
- SAUNDERS, WILLIAM L.—Paper by, 276.
- SCHUMACHER, H. J.—Paper by, 276.
- SCOTT, WILLIAM L.—Memoir of, 285.
- "Screw Steamship and Tow Barge Efficiency on the Northwestern Lakes of America," by JOSEPH R. OLDHAM, N. A.; Read and discussed, 263.
- SEAMAN, H. B.—Discussion by, 284.
- "Sections and Mechanical Conditions of Car Wheels," by P. H. GRIFFIN, read, 200.
- SELBY, OSCAR ELLSWORTH.—Admitted as Junior, 143.
- SELL, WILLIAM DRUMM.—Admitted as Junior, 284.
- SHAILER, R. A.—Presents Photographs of a Novel Folding Bridge, 215.
- SHERMAN, CHARLES WINSLOW.—Admitted as Junior, 266.
- SHINN, WILLIAM P.—Presides at Annual Meeting, 1, 66; Vote of thanks to, 79; Appointed Delegate to Committee on International Congress, 168; On Committee to Prepare Business, 174; Presides at Meeting, 198, 217.
- SICKELS, FREDERICK ELLSWORTH.—Admitted as Member, 1.
- "Single Trap System of House Drainage," by LATHAM ANDERSON, read, 201.
- SISSON, WILLIAM LEE.—Admitted as Associate, 239.
- SKINNER, F. W.—Discussion by, 276; On Committee for Annual Meeting, 284.
- SMITH, HAMILTON, Jr.—Appointed Delegate to International Congress of Hygiene and Demography, 240.
- SMITH, HERBERT STEARNS SQUIER.—Admitted as Associate, 258.
- SMITH, PEMBERTON.—Admitted as Junior, 167.
- "Some Disputed Points in Railway Bridge Designing," by J. A. L. Waddell; Read and discussed, 283.

## SOME.

- "Some Experiments on the Transverse Breaking Strength of Plate Glass," by Geo. W. Plympton; Read, 258.
- "Some Recent Experiments with Dynamite on an Ocean Bar," by O. M. Carter; Read and discussed, 263.
- SPALDING, FRED. PUTNAM.—Admitted as Member, 283.
- SPIELMAN, JOHN GODFREY.—Admitted as Junior, 143.
- SPOFFORD, Prof. J. M.—Address by, 198.
- STARRETT, THEODORE.—Admitted as Associate, 173.
- STITES, ARCHER COCHRAN.—Admitted as Associate Member, 275.
- STORROW, SAMUEL.—Admitted as Junior, 258.
- STOUT, EDMUND COFFIN.—Admitted as Associate, 173.
- "Street Railway Track," Presented and Discussed, 1.
- STUART, ALFRED ALLEN.—Admitted as Member, 263.
- "Table of Tests of Iron Axles made for the Chicago, Burlington and Quincy Railroad," by B. F. PEACOCK, presented, 276.
- TAYLOR, LUCIAN ARNOLD.—Admitted as Member, 275.
- TAYLOR, NORTON LONGSTRETH.—Admitted as Member, 131.
- THAYER, WILLIAM WATMOUGH.—Admitted as Associate Member, 283.
- THOMSON, JOHN.—Paper by, 145, 199; Discussion by, 264, 276.
- THOMSON, THOMAS KENNARD.—Admitted as Associate, 215.
- THURSTON, ROBERT H.—Paper by, 201; Discussion by, 263.
- TRATMAN, EDWARD ERNEST RUSSELL.—Admitted as Associate, 239; Paper by, 258.
- Treasurer, Annual Report of, 2, 88.
- "Trip Through the Big Horn Cañon," by E. GILLETTE, Jr., read, 201.
- TSUJI, TARO.—Admitted as Junior, 266.
- TUBBS, J. NELSON.—Discussion by, 276.
- TUCKER, WILLIAM C.—Admitted as Junior, 173.
- TURNER, EDMUND KIMBALL.—Admitted as Member, 275.
- URQUHART, GEORGE COPELAND.—Admitted as Associate, 173.



## USE.

"Use of Asphaltum in Building Sea Walls," read and discussed, 131.

VAN HOESEN, EDMUND FRENCH.—Admitted as Member, 239.

VAUGHN, GEORGE WASHINGTON.—Admitted as Member, 215.

"Velocity Diagram for Clean Coated Cast Iron Water Pipes Under Pressure," compiled by JAMES DUANE, presented by the Secretary, 284.

VIELÉ, MAURICE AUGUSTUS.—Admitted as Junior, 131.

VON GEMMINGEN, SIGMUND.—Admitted as Associate, 173.

WADDELL, J. A. L.—Paper by, 283.

WALKER, CLEMENT ISAAC.—Admitted as Associate, 167.

WALLACE, JOHN F.—Appointed Alternate Delegate to Committee on International Congress, 203; Discussion by, 284.

WARNER, EDWIN HALL.—Admitted as Associate, 173.

WATSON, WILLIAM.—Admitted as Member, 257.

WEBSTER, ALBERT LOWRY.—Admitted as Associate, 215.

WELD, FREDERICK FLOYD.—Memoir of, 203.

WERNER, EMRICK ADOLPH.—Admitted as Associate Member, 257.

## WESTINGHOUSE.

WESTINGHOUSE, GEORGE, Jr.—Admitted as Member, 1.

WHEATON, EDWARD.—Death announced, 283.

WHEELER, Hon. X.—Address at Annual Convention, 198, 221.

WHINERY, SAMUEL.—Elected as Director, 65; On Committee on Finance, 132.

WHITTEMORE, D. J.—Appointed Delegate to Committee on International Congress, 168.

WHITTON, ANDREW DEMPSTER.—Admitted as Member, 173.

WILKES, JAMES KNAPP.—Admitted as Associate, 215.

WILLARD, J. MILTON.—Admitted as Associate Member, 275.

WILSON, CHARLES ALFRED.—Admitted as Member, 167.

WILSON, FRANK WALKER.—Admitted as Junior, 173.

WILSON, HERBERT M.—Paper by, 198.

WISNER, GEORGE Y.—Paper by, 258.

WÖLFEL, PAUL LUDWIG.—Admitted as Associate, 239.

WOOD, ARTHUR HASTINGS.—Admitted as Junior, 168.

WORTHEN, WM. E.—Presides at Meeting, 167; Paper by, 168.

"Yield of the Sudbury River Water Shed in the Freshet of February 10-13, 1886," by DESMOND FITZGERALD, read, 201.







# American Society of Civil Engineers.

---

## PROCEEDINGS.

---

Vol. XVII.—January, 1891.

---

### MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

---

#### THE ANNUAL MEETING.—JANUARY 21ST AND 22D, 1891.

---

JANUARY 7th, 1891.—The Society met at 20 o'clock, President William P. Shinn in the chair; John Bogart, Secretary. Ballots were canvassed, and the following candidates were declared elected. As Members: Charles Irwin Brown, St. Louis, Mo.; Charles William Hazelton, Turners Falls, Mass.; Frederick Ellsworth Sickels, Kansas City, Mo.; George Westinghouse, Jr., Pittsburgh, Pa. As Juniors: Louis Douglas Fouquet, Walton, N. Y.; and Clinton Levering Riggs, Baltimore, Md.

The Secretary announced the deaths of Addison Connor, M. Am. Soc. C. E., on January 4, 1891; of William H. Paine, M. Am. Soc. C. E., and Past Vice-President of the Society, on December 31, 1890.

The subject of "Street Railway Track" was presented and discussed by Messrs. Gibbon, Elwell, Richardson, Shinn, Cohen, R. L. Harris and Gribble.

JANUARY 21ST.—The meeting was called to order at 10.30 o'clock; the President, William P. Shinn, in the chair; John Bogart, Secretary.

After some discussion it was on motion decided that the ballots for officers would be declared closed at noon.

Messrs. J. G. Dagron, J. B. Johnson and John G. Van Horne were appointed Tellers to canvass the ballot.

The Past Presidents present, Messrs. Francis, Worthen and Becker, were invited to seats on the platform.

The Secretary then read the programme for the meeting.

The annual report of the Board of Direction \* was read by the Secretary, and on motion accepted.

---

\* Printed separately following these minutes.



The report of the Treasurer\* was read by the Secretary, and on motion accepted.

The report of the Board of Censors to award the Norman Medal was read by the Secretary. This report is as follows:

The Board of Censors appointed to award the NORMAN MEDAL for the year terminating August 1st, 1890, report that, in their judgment, the medal should be awarded to Paper No. 426, "Experiments Relating to Hydraulics of Fire Streams," by John R. Freeman, M. Am. Soc. C. E.

Respectfully submitted,

J. J. R. CROES,

FREDERIC P. STEARNS,

*Board of Censors.*

The report of the Committee to award the Rowland Prize was read by the Secretary. The report is as follows:

The Committee appointed to award the ROWLAND PRIZE for the year terminating August 1st, 1890, report that, in their judgment, the prize should be awarded to Paper No. 422, "The Sibley Bridge," by O. Chanute, John F. Wallace and W. H. Breithaupt, Members American Society Civil Engineers.

Respectfully submitted,

ELIOT C. CLARKE,

A. BRYSON, JR.,

JOHN BOGART,

*Committee.*

The President announced the next order of business to be the report of the Committee on Revision of the Constitution and By-Laws, and as the President was Chairman of the Committee to make the report, at his request Vice-President Fteley took the chair.

President William P. Shinn, as Chairman of the Committee, then read the report of the Committee, transmitting the Constitution as amended by it.

The CHAIR (Vice-President Fteley).—Shall the whole revision be read, or is the reading to be omitted? I will ask the question first, shall the whole text of the revision be read? Those in favor say Aye, etc. The Nays have it.

Mr. SHINN.—Mr. President, there are two slight oversights, I may call them, in the text of the Constitution as submitted by the Committee, to which our attention has been called, and which, in the opinion of the Committee, had better be changed at this time. This meeting has power to make the addition by vote, as follows:

---

\* Printed separately following these minutes.

The Committee direct me to offer the following changes:

Article II, Section 3; the same clause which follows the conclusion of Section 2 should have been added, *i. e.*,

“Graduation from a school of engineering of recognized reputation shall be considered as equivalent to two years’ active practice.”

For the purpose of having that incorporated, I move that amendment to Section 3 of Article II of the amended Constitution.

MR. E. P. NORTH.—Would it be in order to move as an amendment to that amendment, since only five years’ active practice is required to become an Associate Member, to change this so that graduation shall be equivalent to one year’s practice, instead of two years’? It makes a man an Associate Member and a voter in the Society on three years’ experience, which is rather small.

THE CHAIR.—The motion can perfectly well be entertained. Mr. North proposes that the modification of the amendment proposed be amended so as to read that graduation will be equivalent to one year’s active practice, instead of two years’, as proposed by the Chairman of the Committee on Revision.

Those in favor of this motion please say Aye. Those opposed, please say No.

MR. GUSTAV LINDENTHAL.—I wish to make the motion that we have a general discussion of the proposed Constitution and of the questions as they come up, and that we take up the matter paragraph by paragraph, and then vote on the amendments as they may be proposed, in order, in that way.

THE CHAIR.—The question is on the motion of Mr. Lindenthal, that the proposed Constitution be read *seriatim* and submitted to the meeting.

MR. NORTH.—I beg pardon; there is a motion before the house that has not been voted on, and should be settled first. I think this is against “Cushing’s Manual.”

MR. A. P. BOLLER.—Mr. President, it seems to me this is somewhat irregular. If I understand the proposition of Mr. Shinn, it is to the effect that the Committee could have permission to introduce that clause, and it has nothing whatever to do with the acceptance or rejection of the report as presented. In voting, it seems to me very irregular, sir, to vote on an independent clause in voting on such a serious matter as the Constitution. As a matter of courtesy to the Committee, I move the following resolution, which I hold to be regular: I move that the Com-

mittee be permitted to introduce the clause named in Article II, Section 3, which section will come up in regular course for discussion and acceptance or rejection before the meeting.

Mr. SHINN.—Mr. President, the members want to bear in mind that this meeting has no authority either to accept or reject the Constitution. This meeting has authority to amend the Committee's amended Constitution. The Committee has no right or authority to make any changes without the authority of this meeting. I have therefore asked, on behalf of the Committee, the authority of this meeting by vote, to add that clause to the third article. The only effect of this meeting's approving of it, by voting that the Committee's report shall be so amended, is that when this Constitution goes out to letter-ballot, it goes out with that clause added. The action of the meeting in adopting that clause has no effect in regard to adopting the report of the Committee, or approving of it, in any way.

Mr. LINDENTHAL.—If the motion is put in the form that the Committee asks leave of the meeting to add this proposed amendment to their report, I will not object, and I will withdraw my motion; but I would like to ask whether it is proposed to have any discussion on this matter, or whether the discussion is denied to this meeting.

The CHAIR.—It is entirely in the hands of the meeting. The Committee, as a matter of courtesy, ask to be authorized, after their very severe labors in preparing that Constitution, to introduce one or two points which have been called to their attention. As the Chairman of the Committee states, this adds absolutely nothing to the position of the report before you. It enables the Committee to present to you what they call an omission of the complete report, and Mr. Lindenthal having withdrawn his motion—

Mr. LINDENTHAL.—I will withdraw my motion conditionally, if the motion offered be changed to this, that the Committee ask leave to make these additions to the report. Not that it be amended and sent out in this way; I am not ready for that.

Mr. BOGART.—Mr. President, I rise to what I think may be a point of order. What it seems to me we have before us now, as I understand it, is a proposed amendment to the Constitution of the Society. This Committee, acting as five Members of the Society, or more, propose an amendment to the Constitution, that is to say, an amendment to the Constitution which happens in this case to be an entire revision. Now,

under the present Constitution of the Society, which is the only law under which we can possibly act, there is a clause in reference to amendments to the Constitution, as follows:

“Amendments presented to the Secretary on or before the first Wednesday in November shall be sent by letter to the several Members of the Society at least twenty-five days previous to the annual meeting.”

Now these amendments were presented before the first Wednesday in November, and have been sent to the Members twenty-five days before the meeting. “Such amendments shall be in order for discussion at the annual meeting.” Nothing that the Committee can do can prevent such a discussion. They are now before the annual meeting for discussion. It is only the annual meeting that can stop the discussion. Such amendments—

“May be amended in any manner pertinent to the original amendments by a majority vote of the annual meeting; if not so amended they shall be voted upon by letter-ballot as submitted. The vote to be counted at the first regular meeting in March.”

That is the Constitution of the Society to-day. That is the way, and the only way, in which we can consider these amendments. This report of the Committee was really presented at the first Wednesday in November, and has been issued to all Members. Now, I am not able to affirm but what Mr. Lindenthal's amendment is proper, that the Committee ask leave to amend the report; but whether that would come in as an amendment, as being part of the amendment of the Constitution proposed, that is a question which I cannot consider.

MR. LINDENTHAL.—I see it is a very fine point. Could it not be this way, that at the proper time, when that part of the proposed Constitution is reached, some member of the Committee would propose the amendment as coming from the Committee? But what I object to is that we commence now to amend sections taken out of the proposed Constitution without general discussion and without other discussion of the proposed matter. I know there are Members present that have decided views, some in favor and some not in favor of the matter, and I now repeat my motion, if I may be in order, that a general discussion be held on the question first, and then, when that has been done, that the Constitution be read, paragraph by paragraph, and discussed in that manner.

A MEMBER.—Was Mr. North's motion affirmatively or negatively settled? It was seconded and put to a vote, and no decision given on the vote.

The CHAIR.—The Chair was interrupted at the moment that the decision was going to be given, and I understood that the vote was negative, that the motion of Mr. North was lost.

Mr. NORTH.—I call for a rising vote.

The CHAIR.—In order that the meeting understand the proceedings before it, I would ask you to rise and make your motion.

Mr. NORTH.—As I understood it, Mr. Shinn proposed amending Section 3, Article II., by adding to it: "Graduation from a school of engineering of recognized reputation shall be considered as equivalent to two years' active practice." I ask permission to amend that amendment so that it should read: "Graduation from a school of engineering of recognized reputation shall be considered equivalent to one year's active practice," making the point that the amendment proposed by the Committee, if it passed, would give a man a direction in the Society with only three years' experience, which I thought was rather small.

The CHAIR.—I believe you understand, gentlemen.

Mr. H. B. SEAMAN.—I want to ask if Mr. North's object is to discourage technical education?

Mr. SHINN.—I believe, according to all parliamentary practice, as Chairman of the committee making this report, I have charge of the proceedings for the time being. On behalf of the Committee I have made a motion that a certain clause be amended; that motion has been further amended by Mr. North; the question has already been taken up once. Now I ask that we get a determination of the wishes of the meeting in regard to my proposed amendment, first taking the rising vote on Mr. North's amendment to the amendment. I wish to say, the Committee has only two slight alterations to make, neither making very great changes in the amended Constitution as offered; they are both made in order to remedy oversights. When they are passed upon I have a few remarks to make upon the general subject, and then I shall hand the matter over to the membership, to deal with as they please, to discuss and amend as much as they please, but for the time being I must ask that, with all due consideration, the motion I have made will be carried through.

A MEMBER.—Will the President be kind enough to read his motion again?

Mr. SHINN.—If the gentlemen present will look at Article II, Section 3, on the top of page 2, they will see the article which I wish to amend.



That amendment proposes that graduation shall be equivalent to two years' active practice; Mr. North proposes that graduation shall be equivalent to one year's active practice.

Mr. T. C. CLARKE.—Is Mr. North's amendment debatable still?

The CHAIR.—Yes; I asked Mr. North to renew his motion, and now the question before the meeting is as to the amendment of Mr. North.

Mr. CLARKE.—The amendment which the Chairman of the Committee proposes at this meeting is simply to bring before this meeting their amended views which does not bind the meeting in any way, and the proper time to accept or alter an amendment is when we come to discuss the whole Constitution *seriatim*; therefore I shall vote against Mr. North's amendment.

Mr. LINDENTHAL.—I withdraw my motion.

The CHAIR.—The question before the meeting is the amendment of Mr. North.

A MEMBER.—I thought you told the meeting that the amendment had been decided. We voted on it, and if it is desired to reconsider it, it will be desirable to make a motion to this effect.

Mr. NORTH.—I think we will get out of this most quickly if I withdraw my motion for the present; I ask permission to do so.

The CHAIR.—The question before the house now is the amendment proposed by the Chairman of the Committee, the addition to Section 3, Article II, of the clause:

“Graduation from a school of engineering of recognized reputation shall be considered equivalent to two years' active practice.”

The resolution was adopted.

Mr. SHINN.—Mr. President, there is one further addition that the Committee desires to make to Section 6 of Article II of the proposed Constitution. There is a provision there that a Junior shall be not less than eighteen years of age, and that his connection with the Society shall cease when he becomes thirty years of age unless he be previously transferred to another grade. The Committee had in view when that section was drafted the provision for associate membership, and believed that a large number of those who are now Juniors could appropriately and properly be transferred to the grade of Associate Member; but the attention of the Committee has been called, since the report was made, to the fact that there are now Junior Members of the Society who are over thirty years of age; some of them may not be qualified to advancement

to the grade of Associate Member. We cannot deprive them, as a matter of law, of their present grade of membership without giving them something else. They have a vested right to remain Juniors unless they are transferred to another grade, and therefore the Committee proposes to add at the end of Section 6:

“All persons who are in the Junior class at the time of the adoption of this Constitution shall not have their status changed by the provisions of this section.”

That is simply to provide that any Juniors who are now, or may hereafter become, more than thirty years of age shall have the right to remain Juniors. The provision that Juniors shall not remain connected with the Society after reaching thirty years of age, unless transferred, will only apply to such Juniors as are hereafter admitted. It is only to provide for the legal rights of those who are now in the Society. On behalf of the Committee, I move this addition to the clause.

The motion was adopted.

Mr. President and Gentlemen, the Committee on the Revision of the Constitution has not had a light task. We have reported to you from time to time what we have done, the number of communications we have received, and the number of meetings we have had; and we have endeavored to convey to the membership the idea that we were giving very careful, very thorough, and very earnest attention to the subject which was committed to us. I think the Secretary would testify, if he were called upon, to the fact that no committee appointed by the Society has ever been more earnest in attention to the duties referred to it, and more diligent in attendance upon the meetings of the Committee, than has the Committee on the Revision of the Constitution. The suggestions made to the Committee have been almost as wide apart as the poles; it was impossible to adopt them all and have any Constitution. It was absolutely necessary to come to some compromise, even among the members of the Committee. There were wide differences in the Committee just at the beginning, but by a process of elimination those differences were gradually narrowed down to very few; and I am very glad to say that with the exception of one member the Committee was unanimous in making this report. That member only objected to two clauses or two articles of the Constitution, and only to a portion of those; in fact, to only one of the articles included in the Constitution proper (that which we call the amended Constitution); so that there is now before you a re-

port which is the result of very earnest consideration, and of very careful compromise between the diverse views presented. The Committee is very desirous that that report should go before the membership for ballot; it is within the power of this meeting to say substantially that it shall not; that is to say, this meeting cannot say that there shall not be any amendments sent out, but this meeting has the power to so change and so amend the Committee's reported Constitution as to make it something which would be out of all semblance to the Committee's report. The Committee thinks and believes that it has now technically and substantially a right to ask that its work shall be voted upon; that it shall be voted upon substantially and actually as reported by the Committee. In asking that, the Committee does not ask that you will not comment upon their work, the Committee does not ask that you will not express adverse views to their work, the Committee does not ask any one here to refrain from expressing any opinion which he may have of the Committee's work; but, with an attendance here of perhaps 150 out of a membership of 1 080 having a right to vote upon this revision, the Committee earnestly desires that the 1 080 shall be given an opportunity to express their opinion. In suggesting that I have also to suggest, on behalf of the Committee, that the Committee has provided opportunity, twice annually, for you to make any changes in the Constitution that you may hereafter desire to adopt. Therefore, if it should be found that any provision of the Constitution, as reported by the Committee and adopted by the Society, did not work so satisfactorily as it was hoped, you can change it at the next annual convention; you can change it at the next annual meeting, or at any other annual convention or annual meeting.

These remarks I was requested by the Committee to make, and with them I leave the matter in your hands.

The CHAIR.—Before proceeding, gentlemen, I wish to remind the meeting that Members only have the right to vote. What are the wishes of the meeting in regard to this matter?

Mr. C. J. H. WOODBURY.—In order to bring this report before the meeting in its proper form, I move that the report of the Committee on Revision of the Constitution and By-Laws be accepted, and the Committee discharged, with the thanks of the Society.

As there are a great many people here from various parts of the country, where there are differences in parliamentary practice, I may say that the object of this motion is simply to bring this report from the

hands of the Committee before the Society, and the motion for the acceptance of the report should not be confused with any possible motion for the adoption of the Constitution.

The CHAIR.—It is moved and seconded that the report of the Committee on Revision of the Constitution be accepted, and that the Committee be discharged, with the thanks of the Society.

Mr. T. C. CLARKE.—If that motion is carried will the effect of it be to prevent any amendments being offered and voted upon by this meeting?

The CHAIR.—No, sir; I do not understand it so.

Mr. C. J. BATES.—As I understand it now, this places this report in a position for discussion; that is all.

The CHAIR.—It does.

Mr. Woodbury's motion was adopted.

The SECRETARY.—I am asked by the Chairman of the Committee to ask if it is proper to read four communications from members not present in regard to suggestions for amendments to the Constitution; is it the desire of the house that I should do so now?

The CHAIR.—Is it the wish of the meeting that the letters mentioned by the Secretary should be read before we proceed farther?

Decided in the affirmative by 65 to 12.

The Secretary then read as follows:

Colonel O. H. Ernst, M. Am. Soc. C. E., writes proposing that Article 6, Section XII, be changed so as to require that advance copies of papers shall be furnished to all Members before publication.

Mr. John A. Wilson, M. Am. Soc. C. E., writes suggesting amendments, which were afterwards offered in his behalf by the Secretary.

Mr. Elbert Nexsen, M. Am. Soc. C. E., writes suggesting an alteration of the amounts for compounding dues.

The following communication was also presented by the Secretary:

At a meeting of Members of the American Society of Civil Engineers resident in St. Louis, held January 14th, 1891, at which the undersigned were present, after a full discussion of the revision of the Society's Constitution proposed by the Committee appointed for that purpose, as well as of amendments proposed by others, the following resolutions in regard to some of them were adopted as expressing the sense of the meeting, and the Secretary was directed to transmit them to the President with the request that they be read at the annual meeting, to be held on the 21st inst.:

*First.*—That in our judgment it is not desirable to retain the Past Presidents of the Society as *ex-officio* members of the Board of Direction.



*Second.*—That the provision of the present Constitution requiring a letter-ballot of the Corporate Members for the admission of new members to the Society should be retained.

*Third.*—That the Secretary and Treasurer should be appointed by the Board of Direction, and that in making their choice the Board should not be limited to the membership of the Society in any grade.

*Fourth.*—That the Nominating Committee should make but one set of nominations for officers of the Society, and that they should report their action during the Annual Convention rather than at a later date.

*Fifth.*—That the proposed local associations or branches should have entire control of the fixing and collection of their local dues, and that the term "Resident Member" should be dropped from the Constitution.

*Sixth.*—That the proposed revision of the Constitution, after discussion at the Annual Meeting, should be referred to a committee for further consideration, such committee to report at the next Annual Convention.

All of which is respectfully submitted.

ROBT. MOORE, *Chairman*.

ROBT. E. McMATH.

GEO. BURNET.

M. L. HOLMAN.

J. B. JOHNSON.

CARL GAYLER.

EDW. FLAD.

N. W. EAYRS.

WINTHROP BARTLETT.

O. B. WHEELER.

J. A. OCKERSON.

CHAS. F. POWELL.

BEN. L. CROSBY.

ISAAC A. SMITH.

S. B. RUSSELL.

(Absent from meeting, but concurring.)

E. D. MEIER.

The CHAIR.—What is the further pleasure of the meeting in regard to this matter of the revised Constitution?

Mr. A. P. BOLLER.—I move, Mr. President, that we take up the proposed amendments *seriatim*, commencing with Article I, discussing them one after the other.

The SECRETARY.—Will Mr. Boller permit me a moment? I just discovered that it is now 12 o'clock; would it not be proper to announce that the polls will immediately close?

Mr. Boller withdrew his motion temporarily.

The Chair announced that the polls were closed.

The CHAIR.—It is moved and seconded that we proceed to read *seriatim* the revision of the Constitution as presented by the Committee, commencing with Article I.

This motion was carried.

The Secretary read Article I, Section 1.

Mr. BOLLER.—I move that it be adopted.

The CHAIR.—It is moved and seconded, that Section 1 of Article I be adopted.

The SECRETARY.—What does it mean, “that it be adopted?”

Mr. BOLLER.—Approved, we cannot adopt.

Mr. S. WHINERY.—I rise to a point of order. This meeting has no right to adopt or approve this draft of the Constitution. If, after the Secretary reads an article or a section, any member desires to offer an amendment, it is in order, I think, to do so; yet, as to anything further, the power of the meeting ceases.

The CHAIR.—I believe the point of order is well taken; consequently, the motion to adopt is not before the meeting.

The SECRETARY.—I suppose the only thing is just to pass to the next section.

Mr. BOLLER.—If no objection is made, you go right on.

The Secretary proceeded to read the proposed Constitution.

The CHAIR.—As the Committee is now discharged, the President is discharged from the chairmanship of the Committee, and can consequently resume his position as Chairman of the meeting, and I will resign the chair to him.

The President (Mr. Shinn) resumed the chair.

The CHAIR.—I would suggest that, if no remark is made, it will facilitate business to consider the section as passed without amendment.

The Secretary read Article II, Section 1.

Mr. P. A. PETERSON.—I would suggest that the class of Juniors be changed to Students or Assistants.

The PRESIDENT.—Do you make that motion?

Mr. PETERSON.—Yes, that Juniors be changed to Students.

The Chair announced the motion.

Mr. COHEN.—Mr. President, I do not favor that motion, and for this reason. We already have a class of Juniors which must remain, because there is no means of legislating those Juniors out of a position in which they have already acquired a vested right, unless with their own consent; therefore, the equivalent of the motion is, that there be introduced an additional grade called Students; now, is there any need for it? The men who will occupy that position in the Society, they are Juniors under this Constitution should it be adopted, are men who have already passed through a student's condition in the various institutions of learning where they may have graduated, or have had a number of years' service in the first principles of the profession, and are entirely unlike a grade of Students as used elsewhere; I refer to the Institution of Civil

Engineers of Great Britain, where a young man commences by an apprenticeship in an engineering office, and is a student and literally a student. We have no such class in this country, and such persons are wholly and thoroughly provided for in this Constitution, where they may come in as Juniors, and may come in as soon as they are in condition to declare a predilection for the profession.

The Chair put the question on the motion of Mr. Peterson, and it was lost.

MR. GUSTAV LINDENTHAL.—I move that the grade of Associate Members be stricken out. My reason is as follows: Section III, Article 2, provides that an Associate Member shall be a professional engineer or architect, not less than twenty-five years of age, who shall have been in the active practice of his profession for at least five years, and who shall have had responsible charge of work as principal or assistant for at least one year; together with the amendment proposed by the Committee in reference to graduation. Section 5 of the same article says:

“An Associate shall be a person, not a professional engineer, who by scientific acquirements or practical experience has attained a position in his special pursuit qualifying him to co-operate with engineers in the advancement of professional knowledge and practice, but who is not a professional engineer.”

Since the vote on the motion as to the grade of Junior has just been taken, it seems likely that the grade of Junior will be retained. Now the distinction between the grade of Junior, as defined by the present Constitution, and the grade of Associate is so widely apart, I think it will lead to a great deal of confusion between that of Associate and Associate Member. We have our Associates now, and I think we ought to retain that grade and not introduce a new grade of Associate Member.

MR. J. N. GREENE.—Mr. President, what is the motion?

THE PRESIDENT.—That the grade of Associate Member, as provided for in this section, be stricken out.

PROF. P. C. RICKETTS.—If you notice in the amendment that has just been accepted on the part of the Committee, that is, that graduation from a school of engineering of recognized reputation shall be considered as equivalent to two years' active practice, that would reduce the active practice of Associate Members to three years, and in that time he should have had responsible charge of work. I do not think that often occurs, that a man who has been in active practice for three years has

responsible charge of work, so there is not much difference between an Associate Member and a Junior.

Mr. COHEN.—It may be proper for me, as a member of the Committee on the Revision of the Constitution, to say a word here with regard to the reasons for proposing the class of Associate Member as distinct from Associate. It is here clearly defined that an Associate shall be a non-professional man, whereas the Associate Member is one who shall be entirely devoted to his profession and practicing it, but who has not yet attained the qualifications entitling him to full membership. There would have been no occasion for the creation of that grade had it not been deemed wise, in arranging the requirements for the grade of Junior, to make them such that young men entering the profession might, at a very early period, become connected with the Society as Juniors; therefore, the lowering of the grade of Junior met the views of those who thought it was desirable to provide for such a class; and it was deemed wise that there should be a professional class between the Junior and full grade of Member, and for this reason the Associate Member was provided.

Mr. E. P. ROBERTS.—I wish to ask the gentleman who has just spoken if it is proposed that Juniors shall pass through the grade of Associate Member before becoming full Members, as it appears that this grade of Associate Member is intermediate?

Mr. COHEN.—In reply to that question I would say that it has been found in the previous experience of the Society, it has come up before the Board many a time, that a man who has been elected years ago as a Junior has not pursued his profession in such a way as to become entitled to the full grade of Member. As the years go on his Juniorship is not agreeable to him, he desires to continue in the Society, and yet he cannot be made a full Member.

In further answer to the question, as it is here proposed, Juniors may be advanced; if they possess the necessary qualifications they may be passed directly into Membership; but if there be a doubt as to their qualifications, they may be advanced to Associate Membership and have an interest in the corporate rights of the Society, become Corporate Members, and yet, not having the qualifications of full Members, they are not so recognized.

Mr. T. C. CLARKE.—It seems to me that the reasons which Mr. Cohen has given for the creation of this class of Associate Members are ex-

cellent reasons and sound, and I think such a class itself a very wise provision, to extend the facilities to those gentlemen who could not come in as Members, as Mr. Cohen speaks of, but I do not think that those gentlemen should have the full privileges of Corporate Members. That is to say, I think they should be included among Honorary Members, Juniors and Subscribers. The reason is this: after they once enter the Society there is nothing to prevent them from passing into the class of full Members, after they have become Associate Members in the lower or second grade; therefore, I shall vote for the amendment to strike out the words "Associate Members," and I shall offer an amendment to that amendment that the article shall read in this way: "The Corporate Members of this Society shall be designated as Members. There shall also be associated with the Society Associate Members, Honorary Members, Associates, Juniors, Fellows and Subscribers, who shall be entitled to all the privileges of the Society, except the right to vote and to hold office therein," etc.

The PRESIDENT.—Mr. Clarke offers an amendment to Mr. Lindenthal's motion; is it seconded? (Seconded.)

Mr. BOGART.—Would it do to say this—that the words "Associate Members" be transferred to the third line, after the words "Honorary Members?"

Mr. CLARKE.—Yes; that "the Corporate Members of this Society shall be designated as Members. There may also be connected with the Society Honorary Members, Associate Members," etc.

The PRESIDENT.—Understand, gentlemen, the question now before the house is Mr. Clarke's amendment as to transferring the words "Associate Members" from the place which they now occupy to the third line, after the words "Honorary Members."

Mr. WHINERY.—There was another reason which actuated the Committee in proposing this new class of members, which Mr. Cohen did not refer to, doubtless from an oversight. The Committee have found there was a very well-defined demand in the Society for raising the standard of full membership. Already that standard had been placed at such a requirement as to shut out a great many worthy members of the profession who did not care to come into the Society as Juniors, and yet who had not the qualifications to come in as full Members. It therefore appeared that the only way in which the demand—which seemed to be a very laudable one—the demand for the elevation of the standard of



membership was to be provided for, was by creating a new class of membership into which the class of engineers to which I refer could find admission, with practically all the rights and privileges of the Society, which they deserve.

Mr. L. F. LOREE.—The gentleman who explained the reasons for the action of the Committee has not satisfied, to my mind, the later conclusions of the Committee. The Constitution as proposed provided an intermediate grade, somewhat more than half way between the grade of Members and Juniors; the age was to be twenty-five, whereas the intermediate, or medium position, would be twenty-four; the period of practice was to be five years, or half the practice of Members. Now the Committee have asked leave and obtained leave to change their report so as to lower that requirement to less than the medium position; they leave the age of twenty-five and lower the requirement to three years instead of five years by their amendment.

The PRESIDENT.—I must rule that the gentleman's remarks are not in order on this question.

Mr. LOREE.—I am quite certain I am.

The PRESIDENT.—Because they are not germane as to the question as to whether the grade of Associate Member shall be stricken out or remain, and as to making Associate Members Corporate or non-Corporate Members. Your remarks were to the effect that the definition of Associate Members was not satisfactory; that would come in under another article.

Mr. LINDENTHAL.—I accept Mr. Clarke's amendment.

Mr. J. J. R. CROES.—Mr. President, I want to offer an amendment to the amendment of Mr. Clarke.

The PRESIDENT.—You can do that, now that it is accepted by Mr. Lindenthal.

Mr. CROES.—That is, that the first clause of Section 1, of Article II, be altered to read as follows:

"The Corporate Members of this Society shall be designated as Members and Associate Members. Associate Members shall be entitled to all the privileges of the Society, except the right to hold elective office thereon. There may also be connected with the Society Honorary Members," etc., etc.

The right to vote is not excluded in this amendment from Associate Members; the right to hold elective office would be excluded; and in making this amendment I think that we are indeed but following the

custom and the unwritten law of the English Society, from which the grade of Associate Member has been introduced. The Associate Member exists in the Institution of Civil Engineers, and, as the Council stated in their last report, the officers of the Society are elected from the full Members, although under the charter Associate Members were entitled to the privilege. This custom, which is an unwritten law, seems to me to be a very proper one, for the reason that only persons in full membership should be entitled to be trustees, managers and directors of a business association; and for that reason I make this amendment to the motion that has been made, that we retain the grade of Associate Members, and that those Associate Members be given all the privileges, except the right to hold elective office.

Mr. CLARKE.—I accept the amendment of Mr. Croes, and withdraw my own.

The PRESIDENT.—Mr. Croes' amendment is accepted, and is before the house. The motion of Mr. Croes is that, following the words "Associate Members" in the second line of Section 1, it be stated that Associate Members shall be entitled to all the privileges of the Society, except the right to hold elective office therein.

Mr. H. W. BRINCKERHOFF.—I would like to make one criticism before discussing this section. While this Constitution that is presented here to-day is called in some of our proceedings the Constitution and By-Laws, there are no by-laws—it is all constitution. There are some things pertaining to the organic law of the Society that want to be clearly set forth, and so guarded that they cannot be tampered with; there are other things, stating in detail how the proposed organization shall be carried out, which should be called by-laws.

The PRESIDENT.—I shall have to rule your remarks as out of order. We are not discussing that question at this moment. The discussion of the question as to whether the Society shall have by-laws is not germane to the subject. I would simply remark that this is a constitution; that the Society has a legal right to adopt such by-laws or rules of order as it may determine upon from time to time. The report of this Committee is in the form of a constitution. I must rule you out of order.

Mr. BRINCKERHOFF.—I stand corrected, and should have asked permission to say what I did, but there seemed to be no other opportunity to say it. I will return to the article which is before us and to the amendment which has been proposed, which proposes to restrict the

right to hold office to the full Members. It does seem to me that it is not wise to tie our hands in that way. The purpose of the Constitution is to facilitate the expression of the wishes of the Society and not to restrict it. You will notice that the right to hold office, and the right to vote, are on an altogether different basis. If you give a man the right to vote he has it at once, and it inheres in him as long as he remains a Member. The right to hold office is entirely different; it is conferred upon him from time to time, at the most. If we wish at any time to have serve us, in the secretaryship or in any other position, a man who has at least had responsible charge of work for five years, we cannot do it under that rule, although he may be the best man available to discharge the duties of the office. It does not seem to me that the duties of our offices require, in all cases, the qualifications that are demanded for full membership. I am not in favor of the policy of electing to office those who are not high in the profession, but I do not think that it is at all necessary that we should tie our hands so that we can never do it if we should think wise. I object to the motion that has been made.

The PRESIDENT.—I hope that the Members will not feel that the Chair is acting arbitrarily in ruling remarks out of order, but we have so much to talk about that remarks that are not germane are liable to be lost, and have to be repeated when the subject comes up again.

The question is raised, Mr. Lindenthal, whether you accept Mr. Croes' amendment to Mr. Clarke's motion?

Mr. LINDENTHAL.—I was somewhat in doubt. I do not.

The PRESIDENT.—Then I will put the question as an amendment. Mr. Croes' amendment to Mr. Clarke's amendment, accepted by Mr. Lindenthal, that Associate Members shall be entitled to all the privileges of the Society, except the right to hold elective office therein.

The motion was lost.

The question will now revert to Mr. Clarke's motion, accepted by Mr. Lindenthal, that the words "Associate Members" shall be stricken out where they now appear and be inserted after the words "Honorary Members," the effect being to deprive them of both the right to vote and to hold office.

Mr. COHEN.—I wish to remind the gentlemen that the Associate Member, if he is created at all, is one who will have had a very considerable experience as an engineer. He will be the peer of a very large

number of the Members of this Society; he will not be quite equal to filling the increased requirements of the full grade of Member, and it does seem as though it would be very impolitic for that reason to deprive him of a voice in the management of the Society. I do not think that in elevating the standard of membership, we are quite prepared to say that no man who has not attained to all the requirements of a Member of full grade shall have no voice whatever in the management of the Society, or that he shall hold no office whatever. I think we are injuring the Society. I think we are depriving men who are entirely entitled to that voice, and we are doing them an injury and injuring the Society. I do not think it can possibly do any harm to allow the Associate Member, who will have high qualification, I do not think it can do any harm to entrust him with a vote.

Mr. E. P. HANNAFORD.—I quite agree with the last speaker, and I rise to support the Committee in its report; that the Corporate Members of the Society shall be designated as Members and Associate Members, because, unless you give the Associate Members an opportunity of voting, it may be asked, what other privileges have they? An Associate Member, by this Constitution, is an engineer who is working as an assistant engineer, second only in authority to the engineer, a full Member, when that full Member on the works is away.

Now, it is to encourage the Associates to come forward in this Society that, as I understand it, is the great object of the Committee in putting this before them as they have done. That is, that the Associate Members hereafter, in due time, shall fill the places and come forward to the ranks of full Members. Therefore, I should be very sorry to see this meeting deprive the Associate Members of what it was evidently the intention of this Committee, after a great deal of thought, to give them.

Mr. LINDENTHAL.—The age of the Associate Member is given as twenty-five years; at that age he is called Associate Member. If his other qualifications are sufficient, and if he keeps on in the profession, he can become a full Member when he is thirty years old, so that the injury done an Associate Member is the withholding from him the right to vote for five years. It has happened under our present Constitution that Members have been admitted into the Society at twenty-five or twenty-six years old, and then have turned around and voted on the admission of Members twice their age, and by such votes persons of twice their

experience have been excluded. I think that it is entirely right that the Associate Members should wait five years before they can vote.

The PRESIDENT.—I would like to remark on behalf of the Committee, some of whom have served, and some of whom are now serving in the Board of Direction, that there has often been a great deal of embarrassment as to the applications of persons who were plainly not Associates, who were plainly not Juniors, who as plainly could not be elected to full membership. We are now working under a Constitution which gives seven years active practice as the qualification for full Member. We have raised that in the new Constitution to ten years. This grade of Associate Member has five years; in other words, five-sevenths of the experience that you require for full Members. It seemed to the Committee not only desirable, but wholly important, that an intermediate grade should be provided for, and that a member of this grade should have the privilege not only of attending the meetings and getting the publications, but of voting; so that this grade was created to cover what seemed to be a long-felt want.

Mr. COHEN.—One word more, that is, that in this grade of Associate Member, if it be repleted from the class of Junior, as proposed by this Constitution, a young man may not be of full age when he enters the Society; and then he shall be required to continue along as a Junior from a period commencing, perhaps, when he is under twenty-one, all the way until he is thirty before he can get full admission to the honors and rights of a Member of the Society. It strikes me as very hard, and I do not think that Members here will deem it quite just; ten years of probation is a pretty long period for one who is actually at work in his profession.

Mr. D. E. McCOMB.—The point that seems to be raised is the advantage to be derived from the elevation from the grade of Associate Member to Member. Under the Constitution as proposed there appears to be no inducement offered in that direction, and no reason why a man should change his position and come into full membership; if it is an advanced grade in the Society there should be advanced privileges.

Mr. OBERLIN SMITH.—I think I thoroughly agree with the Committee in what they have done, except in one point, that is, calling one grade Associates and the other grade Associate Members; it seems to me there may be confusion from confounding these two names so nearly alike.

Mr. HENRY MANLEY.—It seems to me that the Committee in raising



the standard of the grade of membership have practically reduced that grade. The Associate Members have every privilege of a Member, without any distinction except the empty name; and, as has just been said, a man once an Associate Member may continue to be such indefinitely.

Mr. SEAMAN.—He has no object in continuing to be such, because the only incentive to remaining in a lower grade is the question of dues, and the dues are the same.

The PRESIDENT.—I think the point has not much weight, because no gentleman would like to be an Associate Member if he could be a full Member.

The question is that the words "Associate Members" shall be taken out of the second line, and shall be inserted in the third line, after the words "Honorary Members"; having the effect of depriving the Associate Members of the right to vote and to hold office in the Society.

The motion was lost.

A Member asked: What is to become of the Corresponding Members?

The PRESIDENT.—There are only three left; some years ago the Society decided to have no more Corresponding Members.

A MEMBER.—Where will they be classed now?

The PRESIDENT.—Those we have now cannot be deprived of the rights they have acquired, and they continue to be published as Corresponding Members.

Mr. BOGART.—I am requested, on behalf of Mr. John A. Wilson, to propose an amendment to Article II, Section 2, that the words "an Architect or Marine Architect" be stricken out.

Mr. NORTH.—I would like to amend that by moving that the word "Architect" be stricken out and "Marine Architect" be left in. As I understand it, a marine architect is the builder of marine structures; it covers both the modeling of the vessels and the putting in the engines.

Mr. BRINCKERHOFF.—I would like to amend Mr. North's amendment.

The PRESIDENT.—You cannot do that; Mr. Bogart offered this amendment for Mr. Wilson, Mr. North offered an amendment to that motion; you cannot go beyond that. Are there any remarks on Mr. North's amendment? Mr. North's amendment is to strike out the word "Architect."

Mr. HANNAFORD.—I think the word “Naval” in the first line covers the point.

The PRESIDENT.—Is the designing of vessels the work of a marine architect?

Mr. NORTH.—I do not quite understand the definition that way. I understand that a marine architect, for instance, is a man like Horace See, who not only proposes to design the vessel but proposes to design the machinery that goes into it; it is on that basis that I leave in “Marine Architect.”

The motion was carried.

The PRESIDENT.—Mr. North’s amendment is adopted. The question is now upon Mr. Wilson’s motion, as amended by Mr. North, which is to strike out the word “Architect” in the second line of Section 2 of Article II.

Mr. BECKER.—It seems to me that this would be a very improper proceeding, to strike out from the new Constitution a Member who under the present existing Constitution is fully entitled to his membership.

The PRESIDENT.—I would point out to the membership that the reason which Mr. Wilson gives, when he says: “There are men employed in my office that will fill every requirement for admission as full Members, and yet who, any one understanding the matter would say at once, were not such men as should be admitted to full membership in the Society,” that it must be borne in mind that the actual record and qualifications of every applicant are passed upon by the Board of Direction very carefully and very thoroughly, and if the record as set forth in the application and in the endorsements which are received from other Members disclose that the applicant is not entitled to membership, the Board does not pass him to ballot and his application drops, so that the fear that Mr. Wilson expresses there is largely groundless.

Mr. COHEN.—I want to call the attention of the Members to the fact that in the third line from the bottom in the same section, the Member who may be an architect or a marine architect shall be qualified to design as well as direct engineering works. Now, if we have as an applicant an architect or a marine architect who is competent to design as well as direct engineering works, and our Board of Direction, in canvassing his claims, finds he is so qualified, I really think we might be very glad to have him as a Member of this Society.

The PRESIDENT.—Two ballots have just come in by mail, and they can be admitted by unanimous consent. If there is no objection I shall rule that there is unanimous consent to their being counted. As there is no objection they are admitted.

Mr. BOGART.—If this amendment should be adopted, I would move to insert in Section 5 of Article II, the word “architect,” so as to make an architect eligible as an Associate, in accordance with the provisions of the present Constitution. I am speaking entirely for Mr. Wilson, and he suggests this.

Mr. BRINCKERHOFF.—I think the point is that the objection to making an architect a Member is not because he is an architect, but because he may not be an engineer. If an architect is to be considered in regard to his qualifications to design as well as direct engineering work then he is admitted on that ground, which is because he is an engineer as well as an architect. We are an association of engineers, we are not an association of architects; none of us would think of applying for admission to the Institute of Architects. I cannot understand that this would be restrictive or in any way obstructive. It would seem that the term used by the Government, that of Naval Constructors, were better than Marine Architects.

There is one point which it would seem to be better to include in this section; the definition is not complete. In the following section it is provided that a man shall be eligible whether practicing or not. I think we should add this clause, “whether practicing or not,” to this section; then we can find out whether he is eligible under this section, and it eliminates the necessity of Section 4. If it is in order I would move—

The PRESIDENT.—Not in order. There is a motion before the house, and we must act on that.

Mr. J. F. O’ROURKE.—I would like to ask before that question is voted on, whether an architect who is capable of designing a building, say 200 feet high, to be built upon a marshy foundation and to be filled with machinery, whether he would not be a fit associate for those who call themselves engineers?

The PRESIDENT.—The question is upon Mr. Bogart’s motion in behalf of Mr. Wilson, as amended by Mr. North, to strike out the word “Architect.” The motion was lost.

Mr. NORTH.—That vote leaves the section as it stands in print?

The PRESIDENT.—It does now, but it is subject to further amendment.

Mr. BRINCKERHOFF.—I would like to amend this section by introducing, after the second line, the words “whether practicing or not.”

Mr. CROES.—That is covered by the fourth section, I think.

Mr. BRINCKERHOFF.—It is just for the reason that it is covered by the fourth section that I want to put it in here.

The PRESIDENT.—What is your motion?

Mr. BRINCKERHOFF.—My motion is that at the end of the second line of Section 2 of Article II we insert the words, “whether practicing as such or not.”

Mr. COHEN.—The introduction of the words as suggested by Mr. Brinckerhoff, while it amplifies the phraseology of the section, does not alter its meaning in the least, for in the fourth line in the qualifications it states that he “shall have been in the active practice of his profession for ten years”; it does not say, as the gentleman has already noted, that he shall be then in active practice, but he must have been in active practice of his profession for ten years, and that covers the whole ground.

The PRESIDENT.—I hope that the gentlemen will not offer amendments which are merely verbal, and which do not change the sense, unless there is some necessity for it. It is very clear that this exact provision is included in Section 4, and we will not get through at all if Members are going to move to add to one section what is provided for elsewhere.

Mr. Brinckerhoff's motion was lost.

The SECRETARY.—A gentleman has just come in, who has been traveling about the country and did not get his ballot in time to send it in before, and asks whether his ballot is to be counted or not.

Mr. C. W. HUNT.—How long is this to go on?

The PRESIDENT.—It will go on as long as the meeting allows.

A MEMBER.—I object.

The PRESIDENT.—As objection is made, the ballot is ruled out.

Prof. J. B. JOHNSON.—I would like to move an amendment to Section 2, Article II. Add at the close of the section the following:

“The performance of the duties of a professor of engineering in a technical school of high grade shall be taken as an equivalent to an equal number of years of actual practice.”

This does not affect that responsible charge of work which must be added to make the person available for membership, but it seems

to me that it is not exactly just that the men who are really making the engineers of the country are no more eligible for membership; fifteen years ago it was not so. The men who are teaching engineering in our schools are really professors of mathematics; they do not do much practical work in the schools; but the men who are being prepared for engineering in the schools are learning not only books, they are learning a great deal which you cannot learn. They are learning from the laboratories those things which the engineer in the field has no opportunity to know. When he has completed his course he is a long way toward being an engineer, much farther than he used to be. I think it is an injustice to the present rank and file of engineers in professorships that they are not allowed to be Members. I will present this on behalf of the college men; and those of you who are acquainted with the present faculties of our best engineering schools know that they have not only had a great deal of actual practice, but they have had field practice and a considerable amount of it; and it seems to me that considering the arduous duties of a professor of civil engineering in a school of high grade, he should be allowed to turn that in as so many years of practice, at least.

Mr. NORTH.—There are two classes provided for in this amended Constitution: one, the engineers, men who are able to direct the great forces of nature; the other class, those persons not professional engineers, but who, from scientific acquirements or practical experience, have attained eminence in their special pursuits, qualifying them to co-operate with engineers in the advancement of professional knowledge. Now, it seems to me that a professor of engineering may be a man who by long years of study is able to co-operate with the engineer and show him things which he does not know, and which, in the ordinary course of practice, he cannot learn; or he may be a man who has directed the great forces of nature; he may be both, in which case he can take either position he chooses, but I think the distinctions should be continued.

Mr. CLARKE.—It seems to me the request is a very modest one. He does not ask us to strike out the clause that a "candidate shall have had responsible charge of work for five years."

Mr. OBERLIN SMITH.—I cannot see how a man can teach engineering unless he is an engineer. There ought to be some way of ruling them out of colleges if they are not eligible for membership.

Mr. COHEN.—Mr. President, on behalf of, or rather as a member of



the Committee on Revision, I have no objection and can suggest none. I quite agree that a man who is qualified to teach engineering should know it in all its branches, and I think the provision that he shall be qualified to design as well as direct engineering works is quite sufficient to maintain our high standard. I shall favor, sir, the amendment.

The motion was carried.

Mr. BRINCKERHOFF.—With the view of facilitating our business, I suggest that, as we have copies of the Constitution in our hands, the reading of the sections be dispensed with.

The motion to dispense with reading the sections was carried.

Mr. E. P. ROBERTS.—It seems to me that the introduction of one word in Section 2, Article II, might possibly work an injustice. The closing clause states that "graduation from a school of engineering shall be equivalent to a certain number of years' practice." Now, it is quite possible that a man may have remained at a school up to the time of his graduation, and circumstances may have prevented his graduation. I would move, in place of the word "graduation," to substitute, "A full course in a school of engineering of recognized reputation shall be considered as equivalent to two years' active practice."

The PRESIDENT.—The motion is to strike out the word "graduation," and insert the words "A full course."

The motion was lost.

Mr. W. HOWARD WHITE.—In connection with this matter, does the amendment introduced by Prof. Johnson mean actual engineering, or, that the duties of the professorship will be equivalent, etc.?

The SECRETARY.—The amendment adopted was:

"The performance of the duties of a professor of engineering in a technical school of a high grade shall be taken as an equivalent to an equal number of years of actual practice."

The PRESIDENT.—The section states that "he shall have been in the active practice of his profession for ten years," so that the new clause would merely modify that.

Mr. WHITE.—Would it be necessary for him to have charge of engineering work?

The PRESIDENT.—Yes, sir; it would.

We come next to Section 3. You will remember this is amended by adding the last clause of Section 2 to it.

Prof. P. C. RICKETTS.—I move that in the third line the word “five” be changed to “six,” so as to read:

“Who shall have been in the active practice of his profession for at least six years.”

The reason is, because if he is a graduate of an institution, he will have been only in practice for three years, and he will be supposed to have had responsible charge of work during that time.

The motion was carried by a rising vote of 45 to 28.

Mr. NORTH.—I would like to take this opportunity to renew my motion, that instead of two years' active practice it should be one. As it stands, a college education counts a man twenty per cent. for full membership; and for associate membership it counts him thirty-three per cent.

The PRESIDENT.—I think I must rule against the motion as out of order; it has been passed upon once and lost. It was passed upon as an amendment to this section, and at that time your motion was lost.

Mr. NORTH.—I think it was not declared, and I said, to save time, I would withdraw it.

Mr. COHEN.—As a matter of fact, I would like to state to the Chair that it was suggested to the gentleman that he had better withdraw it, and that it would come up properly when the section was under consideration; and he withdrew it with that understanding, as I suppose.

Mr. NORTH.—I understood it was not declared.

Mr. L. F. LOREE.—It was withdrawn in order that the Committee might alter their report. I think we should not take advantage of the gentleman's courtesy to deprive him of his rights now.

The PRESIDENT.—The motion is that in Section 3, Article II, as amended, the words “two years'” shall be changed to “one year's” active practice.

The motion was lost by a rising vote of 27 to 55. Section 4 was passed.

Mr. J. FOSTER FLAGG.—It seems to me that there is a redundancy in Section 5. In the first line it says, “not a professional engineer,” and in the last line, “but who is not a professional engineer.” One of these should be stricken out.

The PRESIDENT.—I think there is no objection to striking out the last.

The SECRETARY.—Mr. Flagg suggests to strike out the first.

The PRESIDENT.—All in favor of striking out the words “not a professional engineer” in the first line of Section 5, say Aye.

The motion was carried.

Mr. BRINCKERHOFF.—As we have decided that architects are eligible for membership, we should be consistent, and we should in Section 6 add at the end of this section after the words “that he intends to become or to continue to be an engineer,” the words “or architect.” I make that motion.

Mr. COHEN.—I do not see what we are to gain by that. If a young man who is studying the engineering profession wants to enter this Society as a Junior, we are ready to elect him and encourage him all we can; but because he proposes to be an architect, that is no reason why we should bother ourselves about him particularly. If, with abilities and capacities to rank with engineers, he comes to the Society and asks admission to such membership, and shows that he has the proper qualifications, we can admit him. There is no reason why we should set up a nursery for young men who start out and propose to be architects and not engineers; there is a very great deal of difference.

The motion was lost.

### ARTICLE III, SECTION 1.

Mr. WILLIAM E. WORTHEN.—A Past President has to be a Member of the Society, doesn't he?

Mr. BOGART.—Suppose he has resigned; we have had Past Presidents who have resigned.

Mr. WORTHEN.—I do not intend to be left out in the cold, that is all.

Mr. LINDENTHAL.—I think Members should be allowed to read the sections before they are passed over. As the motion has been adopted that the reading be dispensed with, I make the motion that the reading be continued.

The PRESIDENT.—It is now moved and seconded that the sections be read as they are taken up.

The motion was carried by a rising vote of 34 to 32.

Mr. R. L. HARRIS.—After the word “applications” in the eighth line of Section 3, I move to insert the words “which shall be considered confidential.”

The PRESIDENT.—The motion is that the words “which shall be con-

sidered confidential" shall be added after the word "application" in the eighth line; the effect being to make the communications transmitted to the Board confidential papers.

Mr. HARRIS.—"Which information shall be considered confidential."

Mr. COHEN.—This amendment which says, "which information shall be deemed confidential," seems to me to require modification. As a member of the Board of Direction for two different years, I know, as a matter of experience, that sometimes information comes to the Board with regard to an application which it is necessary that the Board canvass; sometimes the canvassing results in finding that the objections are not well founded, and the candidate is passed to ballot. If the information which comes in is to be deemed confidential, how are you going to investigate? You cannot act on it. I can understand the writer's name being confidential; the writer's name need not be known; but if you adopt this amendment the only course left open to the Board is to vote against the man and not consider it at all. The communication shall be deemed confidential; the writer's name shall be considered confidential.

Mr. HARRIS.—I withdraw my motion. I make another motion: "which communication shall be considered confidential."

Mr. WHITE.—I would like to suggest, such information always has been considered confidential, I think, and I do not think it will add very much strength to proclaim it. Of course, any member of the Board who is injudicious enough to give out such information would give it out anyway.

The motion was lost by a rising vote of 37 to 42.

Mr. BRINCKERHOFF.—In Section 8 of Article III, I move to amend by substituting the word "acceptance" in the last sentence for "election," to say that membership dates from the date of his acceptance, because he is not yet a Member until he has accepted and signed the Constitution. Besides, if a man makes application just before the first of January, if the application holds over for some months, as might happen, and he be elected near the end of the six months, he will have paid his dues for the whole period, but will receive no return except the publications. It would answer all objections to say, "from the date of his acceptance."

Mr. COHEN.—I hope the motion will not prevail. It may fairly be supposed that when a man applies for membership in this Society, he

means business, and he wants to come in if he can be elected; the dues are not so very high but what he can find the money; but sometimes he is absent, sometimes he is called away to a distance, and considerable time elapses before his membership is consummated by his acceptance and payment of his dues. That is no reason, however, why he should not date from the time when he was elected; the man who is elected at the next meeting of the Society, or one or two meetings afterward, need not take rank ahead of him. I can recall within my own experience that I became a Member of this Society at its re-organization in 1867, and being absent or out of the way, I did not qualify for two or three months afterwards, and some of the men who were subsequently elected dated ahead of me. I recall that by the subsequent action of the Society, that status was changed, and a man dated from the time of election, unless they failed altogether to qualify, and that seems to be the proper way. Of course there may be sometimes exigencies that will prevent a man paying up within a month or so.

Mr. JOHN BOGART.—This very question was discussed a number of years ago, and the present provision is the same as that of the present Constitution. There were a number of reasons brought forward at that time, as Mr. Leverich will remember. In the first place, it is found that a Non-Resident Member who may not be able to complete his acceptance and payment of dues at the moment, would be preceded by a Member elected a month after, but whose residence happened to be just here. This subject was very fully discussed and the principle then established, that membership should begin from the date of election.

Mr. NORTH.—I never knew before that the question had been discussed. As Mr. Cohen mentioned a personal experience, I will mention a personal experience. As I happened under the re-organization, to be the first man who sent in his check, I led for several years all those who came in after the year 1852. Afterward, I believe, they were put in alphabetical order, and the man who happened to be blessed with a name commencing with a letter before N was ranked ahead of me. I am in favor of the motion.

The motion was lost.

Mr. T. C. CLARKE.—In order that no one should have an opportunity to say that he was condemned in his absence, I would suggest the following after the words "he may, if he so desires, present a written defense," in Section 9, insert "which shall be considered at a meeting



of the Board of Direction, of which he shall receive due notice." Then it would require the altering of the next sentence to "after such meeting"; the object being that he shall be allowed to come before the meeting. It will then read thus:

"He may, if he so desires, present a written defense, which shall be considered at a meeting of the Board of Direction, of which he shall receive due notice."

The next sentence will then read:

"Not less than two months after such meeting the Board of Direction shall finally consider," etc.

The PRESIDENT.—Mr. Clarke has stated his motion, the effect of which is that the accused be notified and given an opportunity to be present. The motion was carried.

Mr. J. G. SANDERSON.—Does Section 2 mean that if a man has an office in New York he may be a resident of Chicago or St. Louis?

The PRESIDENT.—The meaning is that wherever a Member has given his official address that shall constitute the determining fact. That is to say, if a Member has an office in New York, and gives to the Secretary his New York office as his official address, he will be a Resident Member; but if he have an office in Chicago, and it suited him to have his mail go to Chicago and to have that as his address, then he will be a Non-Resident Member. It was not easy to establish a basis in regard to this that would be satisfactory to everybody. There were Members who had an office in New York who did not wish to be classed as Resident Members; whether it was to escape the payment of \$10, or for some other reason, we will not undertake to say, but it was a difficult question to decide; finally the Committee came to the conclusion that a Member should declare for himself whether he was a resident or non-resident. The Committee did not believe that any considerable number of Members would choose to have their mail sent to some distant place and appear on the records as having that address, but he can choose for himself. If a Member have an office in New York and reside in Chicago, and give Chicago as his address, he would be classed as non-resident.

Mr. BRINCKERHOFF.—This section provides that a man shall be classed according to his residence before the first of January. If a man has paid his bill for 1891 in December, and after that changes his residence, he would, according to this, be subject to a change in his dues. It would seem fairer if it were determined from the records of the Society

as they may appear when the bills are sent out. I will offer that amendment.

Mr. COHEN.—I think that is hardly worth while. The bills are sent out in the middle of December, yet if a man were to notify the Secretary of any change of residence I imagine that it would be very easy to arrange as to the amount of dues that would be paid, and it would seem that it were a great deal better to fix the first day of January, the beginning of the fiscal year, as the date.

Mr. HANNAFORD.—What is the object of dividing the Society into Resident and Non-Resident Members? I see there is no difference whatever in dues.

Mr. BOGART.—If Mr. Hannaford will read the next section, Section 3 of Article IV, he will see that there is a difference in the dues of Resident and Non-Resident Members.

The PRESIDENT.—There is no date that can be fixed when the same thing would not occur that Mr. Brinckerhoff suggests. The date of the first of January was taken because it was the beginning of the fiscal year. If any person knew in the month of December that he was going to change his residence on the 31st he would not be likely to pay resident dues.

Mr. BRINCKERHOFF.—I will withdraw the motion, although the reasons are not entirely clear to me.

On motion, the meeting adjourned until 15 o'clock.

#### AFTERNOON SESSION.

The PRESIDENT.—I have to announce that Mr. J. G. Dagron, one of the Tellers appointed to canvass the ballot, has been called away, and Mr. H. B. Seaman will be substituted in his place.

The Secretary then read the first section of Article IV.

The PRESIDENT.—My attention has been called to the fact that we have two classes of subscribers not provided for in this article; that is to say, subscribers to the building fund and subscribers to the fund for enlargement of the house; those subscribers have acquired certain rights, the right to receive the publications for life. It might be well to add to this article a new section, stating that persons who have already become subscribers to the building fund or to the fund for enlarging the Society House, shall not have their status altered by anything in this article;

that is to say, they have acquired certain vested rights which we have no right to interfere with or change.

Mr. COHEN.—I make such a motion.

The PRESIDENT.—It is moved that such a section be added to this article.

The motion was carried.

#### ARTICLE V, SECTION 1.

Mr. BOILER.—I criticise with a great deal of diffidence any action of the Committee, because I know the amount of work which has been expended on it, but I see no reason why a Past President should be put into the Board of Direction. It seems to me it would make a cumbersome Board. I see no good reason for this in the explanatory pamphlet which the Committee have issued. I move to strike out the Past Presidents of the Society as members of the Board of Direction. I would like to hear any argument that the Committee have on it.

The PRESIDENT.—It is moved and seconded that the words “with all living Past Presidents of the Society who continue to be Members,” shall be stricken out of Section 1, Article V.

Mr. COHEN.—The only reason why that was put in was, if I remember aright, in the line of conservatism. It was thought that the Past Presidents of the Society, with the experience already acquired, would be able greatly to aid the Board with their advice, and with disinterested advice, because it was derived from experience. That is about the merit of the argument.

The PRESIDENT.—I think there was another argument. Your Past Presidents have served the Society for a year without compensation. At the end of the term they are practically disqualified from holding any other office, because, as a rule, the Past President would not care to be elected a Director or Vice-President, and it was thought by the Committee fit that those persons who have thus served the Society should receive the distinction of being honorary members of the Board, not honorary members of the Society, which would relieve them from the payment of dues. Then, in addition, as Mr. Cohen has stated, it was thought that their influence would be in the direction of conservatism, and that their experience would be valuable. Those two reasons were all that were adduced to the Committee as far as I remember.

Mr. OBERLIN SMITH.—It seems to me that this innovation is a good

one, because it makes the Council a more representative body, not only in regard to time of service, these men having been working for the Society for years, but in regard to place. They are supposed to come from all over the country, and in case the Board of Direction at any time becomes too local, this provision will have a tendency the other way. In addition, it adds dignity and experience to the Council of the Society. The American Society of Mechanical Engineers have adopted this plan.

MR. P. A. PETERSON.—I think it is in the right direction. We should make as much use of the Past Presidents as we can. We choose them as the best men, and they become acquainted with all the ins and outs of the Society during the time they are President. I think it will be found a very valuable addition. In the Canadian Society we started from the very first by having our Past Presidents as members of the Council. We find them our best men, and we find their advice valuable on all questions. I think it is a good beginning; it is the least we can do for them. I think it will be found to be a most advantageous step in the future elevation of the Society.

MR. BOLLER.—I am not very tenacious on that point, but it struck me that it was of an unwieldy character, the large directorship that was created.

I see no specific provision for declaring a quorum. I think it will be a very difficult thing to get a quorum of the Board, unless there is a specific provision for a quorum.

MR. COHEN.—I think you will find that provided for.

MR. LEVERICH.—Nine is a quorum.

MR. COHEN.—On page 11, Article VIII, Section 7, you will read, "nine Members shall constitute a quorum of the Board."

THE PRESIDENT.—Did you intend, Mr. Boller, to withdraw your motion?

MR. BOLLER.—I withdraw my motion.

MR. LINDENTHAL.—I move to strike out the words "the Secretary and Treasurer" in the second line, so that it will read "eighteen Directors, who, with all living Past Presidents," etc. I think that the Secretary and Treasurer should be officers appointed by the Board of Direction.

THE PRESIDENT.—The only motion that could be entertained would be to strike out the words "Secretary and Treasurer."

MR. LINDENTHAL.—Very well, but I gave my reasons.

The PRESIDENT.—The Chair understood you to say that you moved thus and so.

Mr. LINDENTHAL.—I simply gave my reasons. My reasons are, that in my judgment the Secretary and Treasurer should be officers appointed by the Board of Direction, should be subordinate to the Board of Direction, and should not be part of the Board of Direction.

The PRESIDENT.—If nobody else wants to make some remarks I will make some myself.

The Committee is very desirous that the plan which they have elaborated in this article shall receive a trial. Several of the members of the Committee—when I say several I mean more than one person—were originally in favor of the idea advanced by Mr. Lindenthal. Several Members of the Society made that recommendation in their communications to the Committee. Many other Members of the Society made diverse recommendations. The Committee considered this matter perhaps more carefully and more fully than any other subject committed to them, because they felt that it went to the very foundation of the management of this Society. Now I can speak to the membership with more freedom upon this subject than I otherwise could, because I am free to acknowledge that I held the same view myself, and was very strong in that view, until I became a member of the Board of Direction.

Then I had an opportunity to see to what extent the management of the Society, the policy of the Society, and the manner in which the Society should be in touch with the rest of the world, depended very largely upon the Secretary. You are apt to think, gentlemen, of the Secretary as you think of the secretary of any corporation, a business corporation, such for instance as a railroad company. In those corporations the presidents generally, the vice-presidents always, are active salaried officers, to whom is committed the management—the reputation of the corporation. In the case of this Society there is no such condition. Your President is more often a non-resident than a resident. He is able to be at the Society rooms not more than one or two or four or five days in the year, in most cases. He cannot be the active representative man of the Society. Your Vice-Presidents are in the same position. One of them is a resident, but he gets no salary for devoting his time to the services of the Society; and if he attends all the meetings of the Board and a reasonable share of the meetings of the Society, he is obliged to give a great deal of time and thought, for which he gets



no reasonable compensation, and nothing more than the honor of being a Vice-President. Therefore, it seemed to the Committee that it was absolutely essential that the Society should be represented by a man who was himself a trustee, who was himself a member of the Board of Direction, and the highest officer they could find to fill that position would be the officer occupying the position of Secretary. I represent the Committee, therefore, in asking the membership very earnestly to allow this article, the whole article I mean, and particularly the sections regarding the secretaryship, to remain substantially as reported, to the end that the plan may have a trial. If it is not successful after trying it a year you have plenty of opportunity to change it.

A MEMBER.—May I ask, if the plan of having the Past Presidents *ex-officio* members of the Board of Direction goes through, if at the end of the year we desire to change, can we do so?

The PRESIDENT.—That is not the subject which is now under discussion; we are discussing at this moment a motion of Mr. Lindenthal to strike out the words "Secretary and Treasurer."

Mr. METCALF.—In what article?

The PRESIDENT.—Article V, Section 1.

Mr. G. LEVERICH.—What has been may be again. In the history of this Society there was a time when the Secretary represented singly in the Board the non-resident membership, and if he had not been a member of the Board his resignation would have been called for before the Board adjourned.

Mr. WHINERY.—As one of the members of the Committee on Revision of the Constitution, holding the views suggested by Mr. Lindenthal from first to last, I wish to say a few words. This question is probably the most important one involved in this revision. It is one that has been very largely debated and discussed among all the Members of the Society. It seems to me that it would be manifestly unjust, not only to the Society at large, but to a very large proportion of the Society as has been stated here, to pass now on this question which a majority of the Committee, after the most careful deliberation, has thought the best policy for the Society to pursue. I wish to add my request to that of the Chairman of the Committee, the President of the Society, to let this matter go before the Society at large, to let it be passed upon by the Society. If this Constitution shall be adopted, it is perfectly practicable to bring up this question, apart from all others,

and let the Society vote on it. That may be done in less than a year's time, as an amendment may be offered at the approaching convention; but I hope that the Society will allow this portion of the Constitution to remain intact now.

MR. THEODORE COOPER.—Mr. President, it does seem to me that we are hastening along unnecessarily. We have lived a good many years under a Constitution that all have acknowledged has been defective. Whether we shall adopt a Constitution this year or next year is not a matter of a very great deal of importance. In my opinion it had better be postponed five years and be right, than passed this year and be wrong, and be corrected this year or the year after. Now, I appreciate fully the labors of the Committee in trying to harmonize the conflicting views, not only of themselves, but of the Members who approached them with suggestions. To be a Constitution of this Society and be of use, it must meet the views of the Members, not of one Member or for one year, but the Members of this Society; and if our experience has led us to believe that certain features of the past and of the present Constitution are defective, why then, after that experience, should we pass it again? Why not wipe it out and hold this Constitution, if necessary to get it right. I do firmly believe that the working Secretary of the Society should not be a member of the Board of Trustees. If he is a member of the Board of Trustees, he is the Board of Trustees, because the Board cannot compel him to do anything but what he wishes to do; he is not a servant of the Society, he is an autocrat. I am simply speaking of the future, sir; I should have said, will be an autocrat. As a member of the Board in the past, I have felt, and in conversation with many that have been in the Board, I think they have felt, that it would be better if they could have a Secretary who would receive orders as the orders of the Board and carry them out, sinking his own individuality. Now, when we elect one of our eminent Members, he cannot sink his individuality, and he is honored higher than ourselves, because he is left in and we are wiped out at the end of twelve months. I fully believe that the Treasurer is unimportant; I do not see any harm in making the Treasurer a member of the Board; but the working Secretary should be a servant of the Board, subject to their criticisms, orders and dismissal, otherwise they can have no recognition in the administration of affairs.

MR. R. W. HUNT.—I cannot see the force of the argument that a member of the Board is not a servant of the Board, if that Board orders

him to do a certain thing. You might as well say that we cannot appoint a sub-committee in certain organizations. It seems to me that our Society must largely rest upon the Secretary's shoulders; he does the work, he comes in contact with the individual Members; and the only thing for us to do is, to be very careful who shall fill the office, and whether he is worthy to be our Secretary. If he is worthy of the position, he is worthy to be a member of the Board of Direction; and if a majority of the Board differs with him in his views in regard to a particular course of action, he certainly will follow the wishes of the majority.

Mr. COHEN.—I have but very few words, Mr. President, to say on the subject. You have heard it stated that this was the result of very careful deliberation on the part of the Committee, and was the result too of a reconciliation of various views. It has not been found, I believe, within the experience of the members of the Board of Direction, certainly not within that of one who has had two years' experience in the Board, that the Secretary ever had his own views in conflict with those of his colleagues in the Board, but there was a vast mass of business which the members of the Board would have known nothing at all about but for the knowledge and experience of the Secretary. The Secretary when he corresponds with Members in different parts of the country knows their views, hears their views and presents them to the Board, very often when there is no other communication to the Board in that regard; and never, in a single instance in two years' experience, has there been a case where the Secretary came in conflict with the members of the Board, although an equal officer. And suppose any member of the Board sets up his opinion, as he has a perfect right to do, in conflict with his colleagues, it is a mere question of the views of the majority of the Board. In that view, therefore, if the Secretary has views which are substantiated by the majority of the Board, his views would prevail, but not otherwise. Inasmuch as the nominal executive of the Society, the President, and also the Vice-Presidents are most frequently unable to be present—in some instances a President does not appear in the Board the whole year—you are dependent very largely for the conduct of the affairs of the Society upon the Secretary. The Secretary would be greatly hampered if he did not feel authorized to act; and if he had on every occasion to get the views and opinions of his Board, which at best only meets once a month. Therefore, I sincerely hope that the present provision of this proposed Constitution, making the Secretary a

member of the Board, will go through, not as a matter of favor to the Committee, except as in deference to the views of the Committee that that is most for the interests of the Society.

The PRESIDENT.—I was about to remark when Mr. Cohen arose, that there were one or two points brought up by Mr. Cooper which I thought it well to reply to. Mr. Cooper appeared to assume that the present organization, so far as the Secretary was concerned, had been tried and found wanting. The Committee has not come to that conclusion. Now, when the Committee asked for suggestions it received some sixty-seven communications only; or less than one-fifteenth of the Members of the Society responded. Not half of this number advocated any change in this regard. Now it is a general rule applicable to such cases, that the persons who think a change important and necessary are the persons who respond, while those who do not believe in the change, and wish things to remain as they are, take no action; therefore, so far as it appears to the Committee now, the membership has not pronounced in favor of a change of the character proposed. On the other hand, the Committee desires to get an expression of the membership of the Society upon that very point. For that reason the Committee asks that this feature of the Constitution be allowed to go to ballot unchanged.

The other part of Mr. Cooper's remarks, about the Secretary being a dictator, I do not agree with. I will point out, merely that you may not overlook it, that the Committee has provided for an Assistant Secretary, who is to attend to the routine matter, and who is to be appointed by the Board and subject to its orders.

Mr. WILLIAM METCALF.—As you have suggested the submitting this to the Society, when it comes before us for ballot, is there going to be a separate ballot for every clause, or is it to be voted on as a whole?

The PRESIDENT.—Voted on as a whole.

Mr. METCALF.—I consider it of the utmost importance that we should have the opinion of Members here to-day on every question that is raised. In regard to this matter, with considerable experience in societies of this sort, I am firmly of the opinion that if the Secretary is the right kind of a man he is a little more than half of the Society. On him depends the success in every way of the workings of the Society, and my own opinion is that he will be more of a dictator and of more use to the Society, he will carry on the business better, and he will boss the Board better, if he is not a member of the Board than if he is. I think he would be in a

better position for the Society and for himself if he is an elected officer and not a member of the Board, because, so far as my experience goes, I think the Secretary is far more important than all the rest of the Board and executive officers put together; and I believe he will manage affairs better being independent of the Board and not a member of it.

Mr. LINDENTHAL.—I move to amend my motion by striking out the word "Secretary" and leaving the word "Treasurer" as it is.

The PRESIDENT.—The motion now is to strike out the word "Secretary."

The motion was lost.

Section 2 was taken up.

The PRESIDENT.—The object of this provision will be evident to the membership. Because of the value of the knowledge acquired in the Board, the Committee thought it desirable to classify the Board so that there would be no possibility of a general change in the membership of the Board in any one year. It is a plan adopted in business corporations in very many instances.

Mr. CROES.—I move that the first clause be stricken out of Section 4: "Vice-Presidents, ex-Vice-Presidents, Directors and ex-Directors only," etc.

Mr. W. HOWARD WHITE.—I would like to move an amendment to that amendment to continue the striking out through the next clause, "The President shall be ineligible for re-election."

Mr. CROES.—I do not accept the amendment.

I think the selection of a President is an important one. There would be very apt to be a man who was distinguished in his profession who had not been in the Board of Direction and whom we might wish to honor, and it would not be desirable to limit the presidency only to such persons as had been Directors.

The PRESIDENT.—The question is at this moment on Mr. White's amendment.

Mr. WHITE.—It has been suggested that that had better be a separate amendment. I will withdraw my amendment for the present.

Mr. COHEN.—Mr. President, it seems proper to give some reason why the Committee put in that change from the present Constitution. It seemed to them, with the large membership of the Society and the increased number in the Board of Direction, that it would tend to a more careful selection of men as nominees for Directors, if it were fully



understood from the first that the future Vice-President and President were being nominated. It seemed that if these selections were well and carefully made, the experience that the Directors were acquiring, and had acquired, in the management of the Society would best serve the Society's purposes if they were kept in the line of promotion; and even if there were at times very distinguished men who had never served in the Board and whom we might wish to have as our President or Vice-President, if such men were just discovered, it would not take a great while before they would reach the highest honor through the grade of directorship. It seemed to be in the line of conservatism; it seemed to be in that line which would tend to train men up into a knowledge of the necessities of the Society; and that a distinguished man who would be honored with the office of President would, when he reached that high office, know something more of the requirements of the office than perhaps would otherwise be the case.

Mr. BRINCKERHOFF.—If it be wise that Past Presidents should be members of the Board of Directors, it is certainly wise that we should give them a chance to acquire some knowledge of the Society before we elect them as President, and also that the Society should have opportunity to learn something of their qualifications. I certainly think that if the first section of this article is carried out it logically follows that we should let Section 4 stand as it is.

Mr. METCALF.—Why this Constitution is proposed before the Society at this time is, that there is considerable dissatisfaction with the old one. There is also a feeling that the Society in the past has been managed by a great deal of ring; and the object of the Constitution proposed now is to wipe that out and make it a broad, open Constitution, which shall give every Member a fair chance to take a share in the management. Following that out we are struck here by a limitation as to the highest office in the Society, for which I can see no good reason. I cannot believe that the Society is ready to say to-day that they regard their President as anything but a prominent man, whom we take pleasure in honoring by offering him the office. Just suppose that he is to be an active Member of the Society; we know that many times it so happens that it is perfectly impossible that he shall take any active part in the management of the Society. We have provided for the work of the Society, and I think that we ought to preserve the presidency as an honorary thing which we have the right to present to any

man in the Society whom we may wish to honor, without any reference whatever to the fact that he has been, or has not been, in the working ranks of the Board. I do not see any good reason for it. I think that the Society ought to be perfectly free to select a man who, in the estimation of the Members of the Society, is one that we prefer to honor, without any reference to the fact that he has worked in the Board, or has not, and I hope that the motion will prevail.

The PRESIDENT.—The question is on the motion to strike out the first paragraph of Section 4.

The motion was adopted by a rising vote of 59 to 31.

Mr. W. HOWARD WHITE.—I move that the next clause be stricken out.

Mr. NORTH.—In all societies there is a necessity for a certain amount of conservatism. We have made some radical provisions here in this Constitution; we have just made a radical provision in allowing the President to be picked up anywhere and under any circumstances. Now I would like to supplement that by a more conservative provision, that the President can be re-elected. There have been some Presidents of the Society that were of no use to the Society. There have been other Presidents that have been hard-working Presidents, whose influence on the Society was far higher. If we adopt this Constitution, under whatever circumstances it may seem necessary to retain his services for another year, it will be impossible to do so. There is a general feeling, I think, on the part of the Society that the office of President is an honorary one and should rotate; but I think there will be cases in which it will be very desirable to have the services of one man for two years.

Mr. FRED. BROOKS.—If the President, after being once elected, continues thereafter to be a member of the Board of Direction, I should think that his influence might still be exerted.

Mr. OBERLIN SMITH.—It seems to me that it would be better not to let him be re-elected immediately, but to let a year or more intervene.

The PRESIDENT.—For twelve years the practice of the Society has been not to re-elect its Presidents; prior to that time, for almost an equal period, the practice was to re-elect every President. The difficulty about re-electing a President is, that if you re-elect one President, the next President looks to the Society to show its appreciation of his administration by re-electing him; and if the Society does not re-elect him, he and his friends regard it as more or less of a reflection on his admin-

istration. Now, as the Member of the Society who brought about this change, I will tell you exactly how it was done. Up to 1878, for quite a number of years, our Presidents had been given two terms, until it appeared to be clearly understood that every President had two terms. In the year 1878 the first Nominating Committee was appointed at the Boston Convention. I happened to be the Chairman. Mr. Chesbrough was President; that was his first year. I said to the Committee: "We have now about six hundred Members; their age is such that the average extent of life is not more than probably thirty years, so that not more than thirty of that six hundred can possibly become President; and it is scarcely likely that thirty of these would, because many other Members would come in, with this possibility of being President, before the thirty years had expired. Now it seems to me very bad policy to cut down those thirty chances to fifteen." That Nominating Committee nominated Colonel W. Milnor Roberts, and the same plan has been followed ever since. Now we have a Society of 1 080 voting members, the time is not very far distant when we will have 2 000, and it will go on increasing. The office of President is merely an honorary office, and it seems to me that it would be wise policy on the part of the Society to distribute that office as much as possible, and for the reason that I have said: that if one President is given two years the next expects it; it seems wise to put that limitation in the Constitution.

Mr. W. HOWARD WHITE.—I think it is undoubtedly a good custom, and I would like to see it continued, but I would not like to see it incorporated in the Constitution, making it impossible in case we ever wished to re-elect a Past President to the office, to do so.

Mr. OBERLIN SMITH.—Is an amendment in order?

The PRESIDENT.—If germane.

Mr. SMITH.—I move to leave this clause in, followed by the words "until at least two years after his term has expired."

The PRESIDENT.—The Chair rules that it is not germane. The amendment is to strike out the clause entirely, and you cannot amend a stricken-out clause.

The motion was lost.

Mr. SMITH.—I move we add this clause: "until at least two years after his term has expired."

Mr. J. M. GREEN.—I move an amendment to that motion; that the term be five years.

The PRESIDENT.—The motion is that the amendment of Mr. Smith be amended to read five years.

The motion was lost, and the question recurred to Mr. Smith's motion.

Mr. NORTH.—I move that the sentence read: "the President and Vice-Presidents and Directors shall not be eligible to the same office until at least one term shall have expired," striking out "shall be ineligible" in the first clause.

Mr. COHEN.—Mr. President, it has just been decided by a vote of the Society that the clause "the President shall be ineligible for re-election," shall not be stricken out.

The PRESIDENT.—I do not understand that this would conflict with that. Mr. North's motion would make the President ineligible until a year shall have expired. Mr. Smith's was until two years shall have expired.

The question is upon Mr. North's amendment, making the President ineligible for one year.

The motion was lost.

The PRESIDENT.—The question is now on Mr. Smith's motion, that the President shall be ineligible until after two years shall have expired.

The motion was lost.

A MEMBER.—I do not quite clearly understand the qualifications of the various offices.

The PRESIDENT.—That is not under consideration at present. We are on Section 5, Article V.

Mr. T. C. McCANN.—I move that the word "corporate" be stricken out, and in making that motion I would like to explain that I see lacking in Article V the qualifications of all offices. There is no qualification as to who is eligible to office. Are all Members eligible?

The PRESIDENT.—None but Corporate Members. If you will look at the first section of Article II, you will find that it states that Honorary Members, Associates, Juniors, Fellows and Subscribers are entitled to all privileges except the right to vote and to hold office therein. That leaves it entirely in the hands of the Corporate Members.

Mr. McCANN.—Then I move that we strike out the word "corporate" in this section.

The PRESIDENT.—It is moved and seconded that the word "corporate" be struck out of Section 5.

Mr. WOODBURY.—Is it not true that the American Society of Civil Engineers, being an incorporated body under the laws of the State of New York, it is essential under those laws that its officers should be members of the Corporation. That is, has any corporation of any nature whatsoever the right to elect officers who are not members of the corporation, and is not this Section 5 merely a recapitulation of what is rendered obligatory upon the Society by the laws of the State?

The PRESIDENT.—That is a great legal question about which there is now a controversy upon which eminent legal opinions have been given. The Chair would not undertake to pass upon it as a court of last resort, and I do not believe that a vote of this Society would support it. The question involved in this discussion is whether these offices shall be restricted to full Members, or whether they shall be restricted only to Corporate Members, which includes Associate Members as well as full Members.

Mr. BRINCKERHOFF.—It seems to me that this is the same question that we have once passed upon.

Mr. CROES.—By a vote that was not counted; it was very uncertain; the Chair ruled that it was negative.

The PRESIDENT.—I do not admit that.

Mr. CROES.—I did not mean to reflect upon the Chair.

The PRESIDENT.—The question is on striking out the word "corporate" in Section 5. Its adoption would be in conflict with what you have already passed in Article II.

Mr. CROES.—May I say a word on that? I do not think that it is at all in conflict with what has been passed upon. What was passed upon was, that Corporate Members might hold office. In this it says that certain officers, not any officers but certain officers, shall be Corporate Members. It does not restrict the right of an Associate to hold the office of a Non-Resident Director, nor that of President; but it is merely that of the Executive Board, the ruling board, enough to make a quorum shall be Resident and Corporate Members, and consequently that Associates are not eligible to those positions, but to those only.

The PRESIDENT.—Then the condition would be that the Associate who is a non-resident could be elected a Director and Vice-President, and a resident could not be.

Mr. PETERSON.—If the Society wishes to elect an Associate to office,



why should it not do so? I should think the Society at large might be trusted to do so.

Mr. CROES.—I am not restricting the matter at all; you can elect Resident Directors from among the Associates; it is only required that six of them shall be Corporate Members.

The motion was lost.

Mr. BROOKS.—I would like to have some information in regard to the effect of this vote. Suppose, after the six are elected, some of them cease to be Resident Members, would they be expected to resign their office or would that office cease?

The PRESIDENT.—What is the question?

Mr. BROOKS.—If carried out, then in case a man changed his residence during his term of office after being elected, would his place become vacant?

The PRESIDENT.—If a man should become a non-resident, the Board of Directors could declare his place vacant and proceed to fill it.

#### ARTICLE VI.

Mr. BRINCKERHOFF.—In carrying out his duties to carefully collect all moneys due the Society, the Secretary will be more apt to collect them if he is authorized to collect them in advance, as has been heretofore done. The former Constitution contained this provision; what is the reason of this omission?

Mr. COHEN.—I do not quite understand to what your question refers, "he shall see that all moneys due the Society are carefully collected?"

Mr. BRINCKERHOFF.—Yes, sir.

Mr. COHEN.—It is not usual to collect moneys until they are due, except that the dues of the current year are expected to be paid about the time of the first of the year, and the bill is sent out a few days in advance. I believe the Treasurer sends them out in advance of their being due; it is merely to enable the Member to get his money in well ahead of the annual meeting, if that Member sees fit so to remit.

The PRESIDENT.—I think that the criticism is scarcely well founded; because this article undertakes to say what the Secretary shall do, it does not entirely limit him as to what he may do.

Mr. BOGART.—I think Mr. Brinckerhoff's criticism is well taken. It is an omission which I had not noticed, and in the present Constitution there is this provision. Section 3 of Article IV of the present Constitu-

tion says: "The annual contributions shall become due for the ensuing year on the first day of January, and shall be payable in advance. It shall be the duty," etc. That is a very important provision, and has always been carried out, and has resulted in a definite fixed time for the sending of the bills for the annual dues. I should be inclined to think that this omission was a clerical omission. It seems to me that this provision was in one of the revisions which the Secretary of the Committee showed me once. I think Mr. Brinckerhoff's point is thoroughly well taken.

Mr. COOPER.—A Member is liable to certain punishment if his dues are not paid after a certain time.

Mr. COHEN.—It would look as though the Committee on Revision of the Constitution had been, amongst their many duties, a little remiss; certainly there is no provision made.

Mr. BOGART.—I should think that there should be a motion properly to insert that clause into the article of the new Constitution referring to dues.

The PRESIDENT.—It should be in the article referring to dues, not in this referring to the Secretary.

Mr. BOGART.—How would it do to go back to that article?

Mr. METCALF.—I move that the section of the old Constitution just read by Mr. Bogart be incorporated in the new Constitution, under the head of dues.

The PRESIDENT.—If there is no objection raised, we will suspend the consideration of the present article, and take up Mr. Metcalf's motion.

Mr. COOPER.—Allow me to say that if this conflicts with any other section, it ought to be changed.

The PRESIDENT.—It does not conflict with anything, and it may properly come in, I think, at the end.

Mr. CROES.—Under the second section.

Mr. BRINCKERHOFF.—It follows immediately at the end of the present Section 6, beginning: "All moneys thus paid." It might be inserted at the first of Section 7.

The PRESIDENT.—It strikes me that it would be a better place for it after Section 4. Sections 1, 2 and 3 state what the dues shall be, Section 4 states what they shall be to persons transferred; and then make Section 5 state when they shall become due, and that after six months they shall only pay half.

Mr. BRINCKERHOFF.—I accept the suggestion.

The PRESIDENT.—Mr. Metcalf, will you make that your motion, that Section 3 of Article IV, of the present Constitution, be included in Section 5, Article IV of the revision?

Mr. METCALF.—Yes, sir, I accept that.

The motion was carried.

The PRESIDENT.—Now we go back to Section 4 of Article VI.

Mr. BOLLER.—I would like, if in order, to propose an amendment to the last line of the section, "He shall perform all other duties which may from time to time be assigned to him by the Board of Direction, and his whole time shall be given to the Society." I make this motion because I believe that the business of this Society is very large and is increasing all the time; and to properly conduct it, especially where the Secretary is the head and front of the Society—as Mr. Metcalf expresses it, more than half of it—I think it requires the undivided energies of some one man. We have been splendidly served in the past, and it has been a matter of admiration to me how well our Secretary has handled this Society, with all he has carried on outside; but we cannot expect another man to do that. I think that is a very important clause to be put in the duties of the Secretary.

Mr. COOPER.—There is only one point that can be brought up in regard to that. I think it should be effected the moment we can afford to pay for the whole time of a qualified man, but we cannot ask a qualified man to give us his whole time, and we pay him for half of his time. As I have studied the Treasurer's report of finances, it seems to me the question hinges on that, can we afford to pay a man for his whole time and stop him from earning any portion of his livelihood in other directions? I hope we can, and if so, I am most heartily in favor of it.

Mr. CARTWRIGHT.—I think the office of Secretary should not bind a man down to the "spending of his time," when we mean by that giving the use of his brains. My business is largely in consultation, where a question answered pays me better than the time spent; and I think we cannot afford to pay a proper man enough to take half of his time, and debar him from the use of his brains. I think it is right and proper, that as long as he conducts our services properly and gives us satisfaction, I do not see that the Society has any claim upon his talents or knowledge after that.

The PRESIDENT.—I think Mr. Cooper has struck the key-note. It

was what to a great extent governed the Committee in adopting this article in the form you have it. It was felt that the chief executive of the Society ought to be a man capable of earning more than three thousand dollars a year, more than five thousand a year; that the Society was not in condition to pay such a man what he could earn in other employment. That for such services as we desired one-quarter of the time of a ten-thousand-dollar man might be worth a great deal more than the whole time of a five-thousand-dollar man. That he was to give tone and standing and character to the Society, by his representation of it. The Committee put in a provision for an Assistant Secretary to devote his whole time and relieve the Secretary of those routine duties which simply took time, but did not take brains to any extent. I hope the amendment will not prevail.

The motion was lost.

Mr. W. HOWARD WHITE.—What is the meaning of the clause as to having entire charge of the books of account? Does it mean that he is to keep the accounts of the Society?

The PRESIDENT.—Yes, sir.

Mr. FRANCIS.—What are the duties of the Treasurer?

The PRESIDENT.—The Treasurer keeps the money of the Society, and accounts for it.

Mr. FRANCIS.—He will only keep a cash-book then.

Mr. COHEN.—The idea is, in a word, that the Auditor, as the accountant of the Society, shall at any time be enabled to say what moneys the Treasurer will have in his possession. It will be the Treasurer's duty to produce those moneys when called for and account for them.

#### SECTION 8.

The PRESIDENT.—It occurs to me that it might be well to change that period of fifteen days to twenty days, for the reason that fifteen days would make it sometimes necessary to have a meeting of the Board just before the regular February meeting, while the twenty days would allow the meeting to be held the first week in February.

Mr. T. C. CLARKE.—In the ninth clause it says that the Finance Committee shall audit the bills before payment; is it not better, as far as the Finance Committee is concerned, that three members shall be resident within fifty miles of New York? I only ask for information.

The PRESIDENT.—Do you make that motion?

Mr. CLARKE.—Yes, sir.

The PRESIDENT.—It is moved and seconded that the last clause of Section 8 be changed to read: “at least three Members of the Finance Committee, and at least two Members of the other Committees, shall be resident within fifty miles of New York.”

The motion was carried.

Mr. WOODBURY.—I move to amend the first line of Section 8, substituting twenty for fifteen, so that the Board of Direction shall meet within twenty days after the annual meeting.

The motion was carried.

The PRESIDENT.—Inasmuch as the Society has passed the section providing for an Auditor, it strikes me that it might be well to change this word audit to approve. You can hardly expect the Finance Committee to discharge the duties of an auditor when you have now an Auditor to perform those duties.

Mr. COHEN.—I make such a motion.

The motion was carried.

#### SECTION 13, ARTICLE VII.

The PRESIDENT.—Gentlemen, it is due to you that a little explanation should be made as to the reasons which actuated the Committee in making this material and radical change in the method of appointing committees on engineering subjects. It was felt in the first place that it was not just to the Society that any single Member, or any one or two Members, should be allowed to put the Society to the expense of sending out ballots and going through all the motions of ascertaining the wishes of the Society in regard to some matter about which the membership generally might care nothing; so the first provision was that such a motion when made in a meeting should be sustained by the affirmative vote of not less than twenty-five Corporate Members; it was thought if it could not receive the approbation of twenty-five Corporate Members it was not worth bothering with. Next, that when it came up before the Board of Direction for consideration as to whether or not a letter-ballot should be issued, it should receive the affirmative vote of two-thirds of those present, and afterward it should have a total vote of not less than one-third of the total corporate membership. It has been the case that a ballot of this kind interested not over 100 or 150 of the entire voting Members, and the other 800 did not signify any wishes in



regard to it at all. There has been a feeling among a considerable portion of the membership that we cannot be too careful about appointing committees; and after a very careful consideration of the subject by the Committee, it was brought out in this form. Are there any amendments offered to this section?

Mr. J. FOSTER FLAGG.—(Art. VII, Sec. 1). The way this reads it sounds as if it was not simply enclosing the ballot in an endorsed envelope, but that if a Member did not enclose it in the envelope inside, it would be rejected. If that is the case I think it ought to be amended.

The PRESIDENT.—The Chair has ruled in a number of cases that Members of this Society have certainly intelligence enough to comply with the directions in regard to sending in ballots. I do not think that any Member who will not take the trouble to comply with those directions has any ground of complaint if his ballot is rejected; it is not a difficult matter to comply with the directions.

Mr. WORTHEN.—I suppose those two envelopes are merely that the vote shall not be known. I move to substitute that they “may” be enclosed.

Mr. COOPER.—I second Mr. Worthen’s motion, that the word “shall” be changed to “may.” During my connection with the Society I have served as Teller numerous times. I know the onerous duty of tearing open two envelopes and separating them, and counting them is a necessarily tedious operation. The purpose of the two envelopes is to enable a man to vote secretly. Any man who wishes to vote secretly can use two envelopes, seal the inner one, and no one knows anything about his vote. But I do not think you can compel me to vote secretly. If I wish to put my ballot outside of the envelope and write my full name, and say “I, Theodore Cooper, vote this ticket,” I do not think you can disqualify me as a voter.

Mr. FLAGG.—I would propose that each ballot shall be enclosed in a sealed envelope which shall be endorsed by the voter’s signature; it may also be enclosed inside of one that has not been so endorsed.

The SECRETARY.—As I understand the motion it would read thus: “Ballots may be sent by mail to the Secretary, or may be presented to him at the Society House. They may be enclosed in two sealed envelopes, the outer one of which shall be endorsed by the voter’s signature.”

Mr. METCALF.—I would like to amend Mr. Worthen’s motion by

striking out the words "of which"; "the outer one shall be endorsed by the voter's signature."

Mr. WORTHEN.—I accept that.

Mr. McCANN.—I suggest that you put in the grade in the second line on this page.

The PRESIDENT.—That is another subject. Are you ready for the question on Mr. Worthen's amended motion?

The motion was carried.

Mr. McCANN.—I move that on page 10, second line from the top, after the word "nominees," the grade be inserted, so that a voter may know whether the nominee is an Associate Member or a full Member.

Mr. COHEN.—Suppose it reads this way, "and their grades of membership."

The PRESIDENT.—The motion is to insert, after the word nominees, "and their grades of membership shall be given."

The motion was carried.

Mr. COOPER.—I wish to make an amendment to the first line of the first clause of Article VII: "At the business meeting of the Annual Convention a Nominating Committee shall be appointed." That is, I am sorry to say, I object to the whole clause. It is a cumbersome feature of the Constitution and always will be, but I do not intend to take up the time by trying to make it what I would like to see it, as I believe the Members would like to see it. Therefore, I would like to strike out "business meeting" from that clause; the clause would then read "at the Annual Convention a Nominating Committee shall be appointed." My reason is that the business meetings of our conventions are usually at the tail end; the Members have left; only those are left behind, usually, who wish to prepare a Nominating Committee. Whenever there has been a set-up Nominating Committee it has been done by this means. I have seen a Nominating Committee made when there were not forty Members left in the convention.

The PRESIDENT.—Mr. Cooper is perhaps not aware that heretofore the Nominating Committee has not been appointed in the business meeting; it has been in convention. At the last convention in which I officiated, as President, at the business meeting, Mr. Metcalf being Chairman of the Convention, the Nominating Committee was appointed at a recess, but it was in convention, not in the business meeting. It was not at the business meeting that the Nominating Committee was.

appointed at Pittsburgh. In fact, heretofore the Nominating Committee has not been appointed in the business meeting, but in convention. It was thought by the Committee that it was eminently a part of the business of the convention, and therefore that it should be done during the business meeting.

Mr. CROES.—I remember distinctly that the appointment of the Nominating Committee was brought up at the business meeting of the convention; and it was decided, on examination of the Constitution, that that was not the place for it, and it was deferred to a convention meeting which followed it. It was held that the appointment of the Nominating Committee was by the convention, and not by a business meeting held during the convention. I should like to know the reason of the change.

Mr. COOPER.—I have been at conventions where this was done at the business meeting.

The PRESIDENT.—Under the old Constitution the appointment of the Nominating Committee was directed to be made during a convention meeting. So far as I have had any experience, that has always been followed, the Nominating Committee has not been appointed during the business meeting; it was not certainly in the two to which I have referred.

Mr. BOGART.—Perhaps my remembrance of the matter may aid in solving this entanglement. Under the old Constitution, as it has existed for some time, the Nominating Committee has been appointed at a session of the Convention, but it is also true that this session has been held at the time of the business meeting; we have adjourned the business meeting to hold a session of the convention, have appointed the Nominating Committee, and then have resumed the business meeting; so that Mr. Cooper is correct that it has been done in connection with the business meeting.

Mr. COOPER.—And when the least number of Members present represented the Society.

Mr. BOGART.—I must say that that is about so.

Mr. COOPER.—I have seen a Nominating Committee appointed by about forty, and a large number of those voting on it were not Members, but Juniors and Associates.

Mr. COHEN.—It was for the purpose of meeting the objections that Mr. Cooper has set forth that this change was made. It was that the voting Members would be under the control of the presiding officer,

whereas in convention all those present could vote; it was to eliminate from the selection of that committee all those who might not have the right to vote thereon.

The PRESIDENT.—Do you insist upon your motion being put?

Mr. COOPER.—It does not cover all the trouble. I would like to wipe out the whole paragraph.

Mr. PETERSON.—I think this is unsatisfactory; it has been shown that a Nominating Committee has been appointed by a very few Members. I would propose that the first section read as follows: "At the business meeting of the annual convention seven Corporate Members, not officers of the Society, shall be appointed, who with the last five Past Presidents shall act as a committee."

This, I think, will add strength to the Committee. I am certain that any Member nominated will feel more honored by a nomination in this way. Those seven Members might very easily be used by a few, but when we have in addition those five Past Presidents, I think that we can have every confidence, and the whole Society would feel that they would have every confidence in their Nominating Committee. We have in the Canadian Society five Members and four Past Presidents as a committee, and have found it to work very well. It would relieve a great deal of the uncertainty and of the feeling that there is something wrong with the Nominating Committee. I think we might try the putting on our Past Presidents.

The PRESIDENT.—It is moved that there be added "the last five Past Presidents."

Mr. METCALF.—I suggest that we add to that, "if so many be living."

A MEMBER.—Suppose that they are not present at the Convention, what then?

The PRESIDENT.—They do not act at the Convention; the work is done subsequently.

Mr. Metcalf suggests an addition.

Mr. PETERSON.—If they are not living, well, you would have as many as there are.

Mr. OBERLIN SMITH.—Why not say "the five last living Past Presidents?"

Mr. BOGART.—The five last living, or the last living five?

Mr. W. HOWARD WHITE.—How does it read?

The SECRETARY.—“At the business meeting of the Annual Convention seven Corporate Members, not officers of the Society, shall be appointed by the meeting, who, with the five last living Past Presidents of the Society, shall be the Nominating Committee.”

Mr. JOSEPH P. COTTON.—I move to amend the amendment by including all the Past Presidents.

Mr. COHEN.—I think we might say, “these five last surviving Past Presidents, if so many be living.”

The PRESIDENT.—That was Mr. Metcalf’s suggestion.

Mr. BOGART.—If they be not living it reduces the number.

Mr. COHEN.—If so many be not living, then—

Mr. BOGART.—It seems to me the order Mr. Peterson gave is perfectly plain and simple: “At the business meeting of the Annual Convention seven Corporate Members, not officers of the Society, shall be appointed by the meeting, who, with the five last living Past Presidents.”

Mr. COHEN.—If they be not living?

The PRESIDENT.—If there be not so many, then you cannot get them.

The motion was carried.

Mr. BOGART.—I move to amend this section (2) by striking out “and a ballot cast shall not be withdrawn.” I make that motion from a good deal of experience. Some gentlemen have come here already and have found they have voted their check for the annual dues, endorsed as a ballot; now, under the new Constitution we could not get those dues, and the man would lose his vote. It seems to me it is childish that a man should not have, up to the moment of closing the polls, the right to vote as he chooses, and that we should try to have something like a snap judgment on a man to prevent him from voting as he thinks proper. A man may wish to change his vote, or to make a modification.

The PRESIDENT.—I would suggest that your amendment does not go far enough; if you are going to allow the ballot to be withdrawn you do not want it to be in a closed ballot-box.

Mr. BOGART.—They are always put in a closed ballot-box, but it has got a key. This church was closed until we got in, but we got in.

I would then change the motion to: “And the ballot cannot be withdrawn except at the written request of the voter, addressed to the President and Secretary.”



The PRESIDENT.—It is moved and seconded that there be added to the first clause of Section 2, “except at the written request of the voter, addressed to the President and Secretary.”

Mr. CROES.—Of the voter whose name is endorsed upon such ballot.

Mr. OBERLIN SMITH.—Voter thereof.

Mr. THEODORE VOORHEES.—I would suggest that you leave out the word “President”; let it be “Secretary” alone.

Mr. COOPER.—I think it should be a closed ballot-box. There should not be a key when that is acting as a ballot-box, but a Member should have the right to change his mind under new information and send in a second vote. I would simply suggest: “A ballot may be replaced with a second one, upon proper endorsement thereon by the voter thereof.” The first ballot is endorsed, and when received is deposited in the ballot-box. If two weeks after I send a second ballot and withdraw the first, that goes in the ballot-box, and the Tellers are instructed to take cognizance only of the last one, and there we have a closed ballot-box and the opportunity to change the vote.

The PRESIDENT.—Will you offer your amendment?

Mr. COOPER.—It is upon the line I suggested.

The PRESIDENT.—We can only consider amendments, not suggestions.

Mr. BOGART.—I do not care how it is done so long as the man has a right to change his vote.

Mr. COOPER.—That won't allow him to get his ticket out.

Mr. BOGART.—A ballot cast shall not be withdrawn, but a voter may send in a corrected ballot, with the request endorsed on the envelope for substitution.

Mr. R. L. HARRIS.—Before the vote is taken—why not let it go as it is, and then people will be more careful about their vote. I am in favor of voting against that amendment.

Mr. WHINERY.—It seems to me that that may very seriously complicate the work of the Tellers; they would have to go through all the votes to see if there were duplicates, and sort out those and possibly the whole, so as not to get them confused in counting the votes. I fear it might possibly lead to the prevention of a fair ballot.

Mr. COOPER.—As there is a record made in a ballot-book of every vote cast, it would necessarily be recorded against John Smith that two votes are in that box. The Secretary can furnish the Tellers with a list, and he only has before him the last one, and refuses the other.

Mr. COHEN.—It is a mere question of whether they shall be allowed to change them; and if there is a good reason for changing a vote once, there may be a good reason for changing it a half dozen times. I think if the provision of this Constitution will induce Members to be careful in depositing their votes the provision had better stand and a ballot once cast remain. It seems to me it is far safer than to give—

Mr. BOGART.—Safer from what?

Mr. COHEN.—Safer from complication.

Mr. BOGART.—What kind of complication?

Mr. COHEN.—The complication that requires under all circumstances upwards of five hours (five and a half hours) counting the ballot of the Society. If we are to make this change we do not know how many hours it may take.

Mr. BOGART.—This provision of putting the ballots into a closed box, not being able to sort them beforehand, not able to do anything of the kind, introduces a great complication. If the theory of the closed box is that the Secretary is going to tear open the votes and forge somebody's name, he can do that just as well before they are put in any box. I think it is another childish complication, but if that is the wish of the Society we will have the box manufactured and stick the votes in at the top. But that a Member of this Society, when a ballot goes out twenty days beforehand, should not be able to change his vote up to the last moment, seems to me a childish thing.

Mr. SANDFORD FLEMING.—I would like to make a suggestion: ballots received by the Secretary shall not be withdrawn, unless at the special request in writing by the original voter.

Mr. BOGART.—The trouble with that is the closed-ballot-box business.

Mr. FLEMING.—Leave that out.

Mr. METCALF.—Is an amendment in order?

The PRESIDENT.—It is.

Mr. METCALF.—I move that the first paragraph of Section 2 be stricken out.

The PRESIDENT.—That is scarcely germane to the original amendment. Have you any objection to a vote being taken on that, Mr. Cooper?

Mr. COOPER.—I withdraw my amendment in favor of that.

The PRESIDENT.—The motion is now upon Mr. Metcalf's motion to strike out the first paragraph of Section 2.

The motion was carried.

### SECTION 3.

Mr. CARTWRIGHT.—I would amend by striking out the word “publicly.”

The PRESIDENT.—The meaning is not that they shall do it in the street, but that the membership shall have a right to witness canvassing of the votes, to any extent that they reasonably please.

Mr. CARTWRIGHT.—That would all follow leaving out the word “publicly.”

Mr. BOGART.—I think publicly means, publicly to the Members of the Society.

The PRESIDENT.—You wish to insist upon that motion?

Mr. Cartwright's motion was lost.

Mr. OBERLIN SMITH.—Ought we not to define whether anybody can vote more than once or not; it is left open now.

The PRESIDENT.—Have you a motion?

Mr. SMITH.—I only suggest in Section 2 of this article we insert words something like Mr. Bogart suggested, that a vote may be withdrawn and a new one substituted.

The PRESIDENT.—We cannot deal with suggestions; we must have a motion to adopt.

Mr. SMITH.—I move that a clause be inserted in Section 2, to the effect that a voter may change his vote once.

The PRESIDENT.—State how the clause shall read.

Mr. SMITH.—Mr. Bogart, will you please write it for me?

Mr. BOGART.—Everything you said is taken down in shorthand.

The PRESIDENT.—The Society cannot vote upon the proposition that anything to the effect shall be inserted; we must vote upon the precise thing.

Mr. SANDERSON.—You might put it in very few words by saying, “no repeaters.”

Mr. BOGART.—The voter may change his vote once, by written request. If he does not send a properly endorsed ballot it could not be counted.

Mr. METCALF.—I move to amend by striking out the word “once.”

Mr. OBERLIN SMITH.—I accept that.

Mr. BOGART.—A voter may change his vote by written request.

The motion was carried.

#### ARTICLE VIII.

The PRESIDENT.—It is suggested that “thirty Members” shall read “thirty Corporate Members.”

Mr. COHEN.—I move that insertion.

The PRESIDENT.—It is moved and seconded that the word “Corporate” be inserted in Section 5, Article VIII.

The motion was carried.

Mr. KNAP.—In Section 3 of this article, I move to amend by changing to “the second Wednesday.” A great many Members of this Society belong to another Society which holds its meetings on the first Wednesday, so if there is no objection, I move that this be changed to the second Wednesday of the month.

The PRESIDENT.—This Society has held its meetings on the first and third Wednesday of the month for a long time.

Mr. KNAP.—The other Society might change their date; I thought I would bring it up here; it would be more difficult there because there are a great many members outside the city. I would like it very much if it could be done. If there is any objection I will not press it.

The PRESIDENT.—It is moved and seconded that in Section 3, Article VIII, the word “first” be changed to “second,” making the regular meeting on the second Wednesday.

The motion was lost.

Mr. JAMES OWEN.—In the clause in Section 4 is there any change from the old Constitution as to the reading of papers?

The SECRETARY.—In what way?

Mr. OWEN.—Did the old Constitution provide for two meetings a month?

The SECRETARY.—Yes, sir. Will Mr. Owen be sure to have a paper here?

Mr. OWEN.—I only wish to ask whether it was the object to abolish the two meetings a month.

The PRESIDENT.—No; but if there is anything to call a meeting for, it will be called.

Mr. OWEN.—Then there will be no stated meetings throughout the year. We won't know at the beginning of the year when the meetings will be held during the year.

The SECRETARY.—Not unless the Board of Direction issues the notice.

Mr. FLAGG.—I move to amend Section 3 by striking out “the first Wednesday in April,” and substituting “not less than sixty days previous to the Annual Convention.” Ordinarily we hold our conventions in the month of June, but if we hold any more meetings in the South they would be held before the usual date, and this provision would not answer. In place of “on or before the first Wednesday in April,” put it “not less than sixty days,” etc.

Mr. CROES.—I propose an amendment by striking out the whole section.

The PRESIDENT.—Do you offer that as a substitute for Mr. Flagg’s motion?

Mr. CROES.—Yes, sir.

Mr. COHEN.—Mr. President, it was deemed wise to give the membership of the Society an opportunity to correct the Constitution twice within the year, particularly as there were so many entirely new features in this proposed Constitution. Again, at the Annual Convention it very often happens that there is a quite different gathering from what there is at the Annual Meeting here. When the Convention is held in the West, Western men can attend it to a much greater extent than they could the Annual Meeting, and, therefore, it is only fair that they should have this opportunity; that was one object.

The PRESIDENT.—The question is upon Mr. Croes’ motion, to strike out the whole of the third section.

The motion was lost.

The PRESIDENT.—Mr. Flagg’s motion is to substitute for “on or before the first Wednesday in April,” “not less than sixty days previous to the date of the Annual Convention.”

The motion was carried.

The PRESIDENT.—That completes the whole of the amended Constitution as submitted by the Committee.

Mr. COOPER.—There is a point here that strikes me as one of doubt. Under the head of meetings it is stated that thirty Corporate Members shall constitute a quorum; now the canvassing of ballots must be done at a certain meeting in March; suppose there are not thirty Corporate Members present?

The PRESIDENT.—They will have to adjourn that meeting.



Mr. COOPER.—Suppose there is no meeting in March?

The PRESIDENT.—They can adjourn that meeting from time to time.

Mr. COOPER.—All right.

The PRESIDENT.—Article IX, on Local Associations, is a new article. I wish to say on behalf of the Committee that this article is the most violent compromise that we had to make. The differences among certain Members in regard to this question of local associations were very great, and there were very considerable differences in the Committee. The Committee consulted with the officers of local societies as far as they were able, and finally came to the conclusion that they could not see their way to going any further in the direction of affiliation with local societies than is here provided for. It will be certainly disappointing to some who thought that we should take in the local societies, and, on the other hand, it may be disappointing to some who thought that we should have nothing to do with them. It is, at any rate, an experiment and the Committee put it in such form as they believed could do no harm, if it did no good.

The Secretary read the proposed Article IX.

Mr. METCALF.—I suggest that we have this read over in its entirety. It seems to me that the adoption of this thing is going to open the door to the financial destruction of this Society, at least. I think that it would be well to read the whole article over, so that we may know what we are going to discuss; I request that it be read through.

The Secretary read the proposed article.

The PRESIDENT.—What is your further pleasure.

Mr. METCALF.—I move that it be laid on the table.

The PRESIDENT.—Gentlemen, it strikes me that that motion at this time, by this meeting, would be very discourteous to this Committee. The Committee has probably—

Mr. METCALF.—I rise to a point of order; a motion to lay upon the table is not debatable.

The PRESIDENT.—I will ask unanimous consent to make a statement.

Mr. OBERLIN SMITH.—I move that the President can make a statement.

The PRESIDENT.—I wish to state, and have stated, that it would be extremely discourteous to this Committee to prevent this proposition for the establishment of local societies as branches to go before the membership. I do not believe in the first place that, as a matter of order,

this meeting has any authority to lay it on the table. It has got to be sent out to the membership, either in the form in which it now is, or as it may be amended by this meeting. The Committee has spent a great deal of labor on this amendment, in order to make it acceptable to the Society. If the Society rejects it upon a vote, the Committee does not, and will not, feel that it has been injured in any way. The Committee does not feel that its recommendations must be adopted by the Society, but the Committee is desirous that this particular subject should come before the Society as nearly as possible in full. I shall rule the motion of Mr. Metcalf as being out of order.

Mr. OBERLIN SMITH.—I move that this article be discussed as a whole by us now, and that our discussion be printed and sent with the article to the membership, when it is sent out for ballot.

Mr. COHEN.—I second that motion. I think it is very important that the views of this meeting be known to the Society. When this Committee was appointed, a year and a half ago, some of us were greatly impressed with the idea that a large proportion of the membership of the Society insisted upon the recognition of the various local societies. A great deal of care and attention and thought was given to this subject, as Mr. Shinn has already stated; you have a formula here which will accomplish a great deal of what was so earnestly desired by a large proportion of the membership; and I think it is only fair to them that they should have an opportunity of considering it.

Mr. METCALF.—I wish to ask a question. I understand that it is ruled that my motion to lay on the table is out of order, because this, being part of the Constitution proposed by the Committee, must be submitted to letter-ballot. It is ruled that this Society cannot amend any part of it by laying on the table, yet it says here in the few lines at the head of the article, "if adopted is to be sent out." Suppose we do not adopt it? I do not see how I am out of order.

The PRESIDENT.—This meeting has not authority to adopt. If adopted, by letter-ballot.

Mr. METCALF.—This meeting is bound to send out, practically, all that the Committee proposes?

The PRESIDENT.—Yes; either in the form that the Committee proposes, or as amended.

Mr. METCALF.—Then I move to amend it by striking it all out.

The PRESIDENT.—The amendment is out of order.

Mr. VOORHEES.—There is a question already before the house.

The PRESIDENT.—The existing Constitution is very definite upon that point. It says amendments may be amended in any manner pertinent to the original amendment. It is not very pertinent to this amendment to strike it out.

There is a motion before the meeting that has not been acted upon; that this article shall be discussed as a whole, and that, when sent out to ballot, it shall be sent out with the discussion of this meeting.

Mr. METCALF.—What I object to particularly, is having this go out as a part of the report of the Committee, to be voted on as a whole. If we could devise any way by which the membership could make a separate ballot on this subject, I would have no objection to this going out.

The PRESIDENT.—The Committee, in its report, says, “these two amendments are to be submitted, discussed and voted upon separately.”

Mr. METCALF.—That alters the matter. I have no further objection to offer. I had forgotten the reading of that report.

The PRESIDENT.—It was so arranged by the Committee for that very purpose, that the question of the adoption of this particular amendment should not complicate the adoption of the Constitution in general.

Mr. CROES.—Most of the Members present have made up their minds pretty well, I think, with regard to this section. I would suggest that instead of discussing it and sending out the discussion, a vote be taken and the result of the vote be sent out, with a communication to Members, that they may know how the Annual Meeting looked upon it; that a vote be taken here, and the record be sent out to ballot as the sense of this meeting.

The PRESIDENT.—What is your motion? •

Mr. CROES.—That a vote of approval and disapproval of this whole article be taken at this meeting, and that the result be sent out in connection with the letter-ballot. I move an amendment to Mr. Smith's motion to that effect.

The PRESIDENT.—Mr. Smith, do you accept that?

Mr. OBERLIN SMITH.—No, sir.

The PRESIDENT.—That motion is not germane.

Mr. CROES.—It was only to facilitate matters that I suggested it. That is all that is wanted to go out to the Society. The discussion in the whole would not influence anybody's opinion at all.

The PRESIDENT.—Then, let the Members present vote on Mr. Smith's motion, and we will be prepared to vote upon another motion.

Mr. WHINERY.—I would amend Mr. Smith's motion in this way, that a synopsis of the discussion, giving the reasons for and against, be sent out with the ballots.

(This was accepted by Mr. Smith.)

The PRESIDENT.—The motion is that a synopsis of the discussion be sent out.

Mr. NORTH.—I would like to say one word. This is a pretty important question, in that a great many men who do not live in New York and cannot get to New York are very much in favor of affiliated societies, branches or whatever you please to call them. It is now about dinner-time; we have had a pretty long session, and I do not think the discussion on this question will be very valuable. Now, it is not proper to make a third motion, and yet I would like to say that I think it would be better for the persons who object and those who approve, each to make a written statement and send this out, rather than to send a discussion by men who are all a little bit tired and somewhat hungry. We have discussed a great many points, and I think nearly everybody is tired. The people who object to it can make a written statement that will set forth the objection much better than what they would say orally, and the people who like it can make the same statement. I do not know that I have got face enough to ask these gentlemen to withdraw their motions, but I think it would be better.

Mr. SMITH.—I do not know but that would be a good plan, but I think it would be better to have it voted on as an amendment.

The PRESIDENT.—The question is amended on the motion of Mr. Smith, that a synopsis of the discussion be sent out with the letter-ballot on this amendment.

The motion was lost.

Mr. CROES.—I move, and without expressing any sentiments of my own:

“*Resolved*, That it is the opinion of this meeting that the proposed amendment, Article IX, should be adopted.”

The motion was lost by a rising vote of 43 to 28.

The PRESIDENT.—I have the report of the Tellers of the ballot for officers. Is it your pleasure that the report be read?

The Secretary read the report as follows:

Total number of ballots received.....	711
Delinquent on dues.....	7
Envelopes, stamped, without signature.....	5
Envelopes, blank, without signature.....	4
Votes counted.....	695

---

The following is the vote:

*For President:* O. Chanute, 690; J. James R. Croes, 1; J. C. Trautwine, Jr., 1; Mendes Cohen, 1; George H. Frost, 1.

*For Vice-Presidents:* Alphonse Fteley, 653; Charles Hermany, 689; Walter Katté, 29; Charles B. Brush, 6; John Bogart, 4; C. B. Comstock, 1; Charles Macdonald, 1; A. Bonzauo, 1; John C. Trautwine, Jr., 1; Jacob Blickensderfer, 1; D. McN. Stauffer, 1; A. M. Wellington, 1; L. L. Buck, 1; V. G. Bogue, 1.

*For Secretary and Librarian:* Francis Collingwood, 481; John C. Trautwine, Jr., 214.

*For Treasurer:* John Bogart, 456; A. P. Boller, 228; W. Howard White, 4; F. Collingwood, 3; George S. Greene, Jr., 2; O. F. Nichols, 1; Charles B. Brush, 1.

*For Directors:* Samuel Whinery, 688; Clemens Herschel, 688; Edward P. North, 687; Rudolph Hering, 603; Charles B. Brush, 461; James E. Childs, 221; V. G. Bogue, 113; C. H. Myers, 7; A. P. Boller, 3; Theodore Cooper, 3; J. J. R. Croes, 1; James Dun, 1; John W. Hill, 1; F. Collingwood, 1; Cook Talcott, 1; A. M. Wellington, 1; M. N. Baker, 1; W. H. Bixby, 1; E. E. R. Tratman, 1; C. W. Baker, 1; C. C. Martin, 1; F. P. Burt, 1.

Respectfully submitted,

JAMES G. DAGRON,  
J. B. JOHNSON,  
H. B. SEAMAN,  
JOHN G. VAN HORNE.

The PRESIDENT.—Gentlemen, I declare elected as your officers for the ensuing year: President, Mr. Octave Chanute; Vice-Presidents, Alphonse Fteley, Charles Hermany; Secretary, Francis Collingwood; Treasurer, John Bogart; for Directors, Samuel Whinery, Clemens Herschel, E. P. North, Rudolph Hering, Charles B. Brush.

Gentlemen, it is now dinner-time, and a motion to adjourn until 20 o'clock will be in order.

The SECRETARY.—At the meeting at 20 o'clock the first business will be the presentation of some very interesting reports of certain committees, which the discussion on the Constitution has prevented the recep-



tion of. That will take a short time, and the paper by Mr. O'Rourke will follow.

The PRESIDENT.—I wish to say that if the Secretary and the Stenographer are here at 20 o'clock this meeting will commence then; we cannot wait until twenty and a half or 21 o'clock, with all we have to do to-night. This meeting is now adjourned until 20 o'clock.

#### EVENING SESSION.

The session was resumed at 20 o'clock, the President in the chair.

The PRESIDENT.—Gentlemen, in the hurry of our adjournment, a vote of thanks to the Tellers who have counted an enormous ballot, and who are especially entitled to the thanks of this Society, was overlooked.

Dr. THOMAS EGGLESTON.—I move that the thanks of the Society be extended to the Tellers for their labor in counting the vote for officers. (Carried.)

The PRESIDENT.—I will call for the report of the Committee on Uniform Standard Time.

Mr. SANDFORD FLEMING.—In presenting this report I desire to say that it is signed by myself as Chairman, Dr. Thomas Eggleston, John M. Toucey and Mr. William P. Shinn as *ex-officio* member of the Committee. The two other members of the Committee who have not signed it are Mr. Ely—to whom I wrote some few days ago, asking him to let me know if he approved of the draft of the report, and if he did not, to suggest any amendments he desired; I also asked him if I might take his silence as approval. He has not communicated with me in any way, so I really do not know, but I think I am justified in assuming that he approves. Another member, Mr. Frederick Brooks, of Boston, has not signed the report; he does not approve it entirely, and will probably explain his views. He thinks that the report ought to embrace other subjects than those referred to in it. We think that we can only deal with the matters which were referred to us, and we deal with them accordingly.\*

Mr. FREDERICK BROOKS.—Mr. President, the Chairman of the Committee has stated that I found myself unable to agree with the report. I have prepared a minority report, with a view of its presentation to the Society, but I think the Members have come here to-day for the purpose of hearing about other subjects, and it would be just as well if that report

---

\* All reports not inserted with the discussions will be found at the end of the Proceedings.

could be received without being read; and could be printed with the Proceedings. I make this suggestion that my report be received without the Society knowing what it is; but I would like to say that by the courtesy of the Chairman, copies of it have been sent to the other members of the Committee, including Mr. Shinn; and I do not understand that they make any objection to the report being prepared for publication. It was stated by the Chairman that my report was not limited to the subject referred to by the Committee. If that is considered an objection to its presentation, perhaps I might be allowed to read it, with the understanding that the Chair will exercise its discretion and inform me when I come to anything that is not germane to the subject. I submit a minority report.

Dr. THOMAS EGLESTON.—I offer the following:

*Resolved*, That the annual report of the Special Committee on Uniform Standard Time be accepted, and the Committee continued.

*Resolved further*, That copies thereof be formally brought by the Society to the attention of the members of the General Time Convention, and the railway authorities generally of the United States and Canada, for their information.

Mr. BROOKS.—I think the portion as to the acceptance of the report should be one resolution, and the second clause another resolution.

Dr. EGLESTON.—I have no objection.

*Resolved*, That the annual report of the Special Committee on Uniform Standard Time be accepted and the Committee continued.

This motion was carried.

The other is:

*Resolved*, That copies of the report be formally brought by the Society to the attention of members of the General Time Convention, and the railway authorities generally of the United States and Canada, for their information.

Mr. BROOKS.—That resolution seems to me open to criticism in one particular. The Society about two years ago passed a vote which authorized and requested the Committee on Uniform Standard Time to address the General Time Convention, and I think the Committee had the power to address them. Two members of the Committee are in active management of railroads and in close relation to the General Time Convention; and it seems to me that it is not exactly reasonable, unless with the concurrence of those two members, that the Society be requested by the Committee to formally approach the General Time Convention.

With regard to those two members, the opinion of one of them has not been given lately, and the other one, unfortunately, has not met with the members of the Committee for personal discussion.

DR. EGGLESTON.—I would like to say this with regard to this matter. This Society has done more for the furthering of standard time, making standard time uniform on this globe, than all the other societies put together. Perhaps no foreign societies and no collection of societies have done as much. It appears by the report of the Chairman that standard time is about to be adopted by most of the nations, and by most of the nations in Europe. It is desirable that there should be nothing done here which might conflict with what is being done abroad, that everything should be in uniformity. It is desirable, in the opinion of the majority of the Committee, that we should be able to confer, that we should be able to attend the sessions of other committees officially, not as individuals; and it is in this view that the Committee has presented the resolution asking the power to have this printed, and to communicate officially with other societies. Supposing Mr. Brooks' idea prevails, the result will be the majority of the working members of the Committee will not be in attendance to present the report at the Convention of the Society during the summer months, and the matter will therefore lapse. The Board of Direction did me the honor to appoint me the delegate to carry the memorial to Washington, and I can only say that this Society has every reason to congratulate itself. It was the Society that was received, and not myself. Within three hours after I presented the matter, the desires of the Committee had been reported and referred to a committee, and in less than a week we have received the bill. There is an interest in the subject, which, I think, the Members little dream of. In case there is not time for the bill to be acted upon in Washington during this session of Congress, the Committee has every assurance, from remarks that were made, that the law will be passed early in the next session. In my opinion, as a member of the Society, it would be very undesirable to have delay. If the Society feels the same confidence in the Committee which it has heretofore expressed, I think the resolution which has been presented will be adopted.

THE PRESIDENT.—Does Mr. Brooks desire to offer any amendment?

MR. BROOKS.—No, sir; I desired to discuss it; I have done.

Dr. Eggleston's resolution was carried.

The PRESIDENT.—What does Mr. Brooks desire to be done with his report?

Mr. BROOKS.—I move that the report presented by a minority of the Committee be received and printed.

The PRESIDENT.—I think there will be no objection. It is moved and seconded that the report of the minority of the Committee on Standard Time be printed with the report of the Committee in the Proceedings of this meeting without the report being read. (Carried.)

The PRESIDENT.—The next business is the report of the Committee on Units of Measurement.

Dr. EGLESTON.—The report which I am about to read has been signed by all the members of the Committee except Mr. Gould, who could not be reached, and therefore could not sign the report.

The Committee on Units of Measurement beg respectfully to report that, owing to the fact that the Committee has been only recently organized, they have been able to hold but one meeting. Business which had been prepared by individual members of the Committee and by other persons was presented and discussed.

It is considered expedient by the Committee to obtain expressions of opinion on some of the subjects presented to them from as large a number as possible of engineers and scientific men in this country and elsewhere; and the Committee recommend that they be allowed as a committee to correspond with societies and individuals, with a view to obtain both facts and expressions of opinion on the various subjects that they have or may have under consideration; and that for this purpose they have authority to print such circulars as may be found most useful for obtaining the desired information.

The Committee have had a joint meeting with similar committees appointed by other societies, and wish authority from the Society to sit in such joint conference with such committees, as often as may be desirable for furthering the object for which they were appointed.

The Committee also recommend to this Society the adoption of the "Henry" as the unit of self-induction. They beg to state that they have under contemplation the recommendation of the "Franklin," for some unit to be subsequently determined.

They also desire that this Society recommend to the Secretary of the Treasury, to cause the present value of the Troy Pound now in the Mint at Philadelphia to be determined, either by its comparison with an equivalent weight of water, or with the international weights now in the Bureau of Weights and Measures in Washington.

The Committee therefore report the following resolutions for action, and respectfully ask to be continued:

*Resolved*, 1st, That the Committee on Units of Measurement be authorized to print such circulars as they may find necessary to obtain facts and opinions relating to the subjects brought before them.

*Resolved*, 2d, That the Committee on Units of Measurement have authority to sit in joint conference with the committees of other societies discussing similar subjects.

*Resolved*, 3d, That the American Society of Civil Engineers recommend for adoption the Henry as the unit of electrical self-induction.

*Resolved*, 4th, That the American Society of Civil Engineers respectfully requests the Secretary of the Treasury to cause a comparison to be made by a commission of experts of the Troy Pound now in the Mint at Philadelphia, with the international standards now in possession of the Bureau of Weights and Measures in Washington; and its value determined either by these standards, or by a comparison with an equivalent volume of water.

THOS. EGLESTON,  
GEO. W. PLYMPTON,  
SCHUYLER S. WHEELER,  
GEO. M. BOND.

I suppose that it will be necessary that these resolutions be taken up and discussed.

The PRESIDENT.—The first action will be to accept the report and continue the Committee. A motion to that effect will be in order.

Mr. BOGART.—I make that motion. (Carried.)

Dr. Egleston read the first resolution as above.

This resolution is necessary in order that the Committee may not act as individuals, but act with a due number of scientific bodies backing them.

The PRESIDENT.—It is suggested by the Secretary that, as the adoption of that resolution will involve expenditure by the Society, it ought to be amended to read “with the approval of the Board of Direction,” so that the expenditure shall be under the control of the Board, if the gentleman will insert that.

Dr. EGLESTON.—Certainly, I ought to have thought of that. The resolution then is:

*Resolved*, That the Committee on Units of Measurement be authorized to print, under the approval of the Board of Direction, such circulars as they may find necessary to obtain facts and opinions relating to the subjects brought before them.

The resolution was carried.

Dr. Egleston read the second resolution, and said:

I wish to add in regard to this, the Committee wishes the official action of the Society if the Society will give it, because there are several other committees, both in this country and abroad, who are discussing



the same subjects. The chairman of one of the committees is the head of the Bureau of Weights and Measures in Washington. The Committee wish to be clothed with the dignity possessed by the Society, not as individuals, but as the official representatives of the Society.

Mr. A. FTELEY.—It seems to me that inasmuch as the Society is not responsible for the opinions expressed by its Members, it would not be in keeping with that policy. If Members are sitting with committees or bodies, it ought to be understood that the opinions expressed by the Members who form the Committee of our Society should be understood to come from themselves, although as a body they represent the American Society of Civil Engineers. The Society ought not to be responsible as a body for the opinions that they express.

Dr. EGLESTON.—I may say in reply that no member of the Committee has any idea of doing anything without referring their action to this Society and asking for the approval of the Society. All they can do is to recommend. The object of the resolution is, that this Committee might be in accord with the committees of the Society of Electrical Engineers, the Mechanical Engineers and the Mining Engineers; all working in the same field. The electrical engineers and the other societies will adopt the same resolutions that have been, or may be, adopted by this Society.

The PRESIDENT.—It is the general principle of this Society that no committee has any authority, except so far as the Committee may be specifically and in terms authorized. Therefore, any proposition of this Committee would be subject to the approval of the Society.

The resolution was carried.

Dr. Egleston read the third resolution.

In calling for this Committee at the last annual meeting, I called the attention of the Society to the fact that although electrical standards have been named after some of the greatest electricians, yet that the names of Franklin and Henry have never been thus recognized. As is generally known, Prof. Henry discovered the property of self-induction in electricity. It was felt among those interested in electrical subjects that it was here that his name should be recognized; so they immediately went to work to find a unit for it. This unit they have named the Henry, and if this Society adopts this unit, it will be in accordance with the movement of all the engineering societies in this country. I

hope it will be adopted, as it has been by the Society of Electrical Engineers.

The resolution was carried.

Dr. Egleston read the fourth resolution.

It has been my privilege several times to be called upon by the United States Government to make a comparison of this Troy pound. I have often given expression to my alarm in regard to this weight. There is a reason for alarm, because, with the knowledge that we have to-day of the variations in the constitution of metals, it is desirable that the exact value of this weight should be known. The weight and gravity of the metal never has been determined. Besides that, until a number of experts in this country protested against it, Congressmen were in the habit of taking that weight up in their moist hands. It has happened several times that I have had to prevent this by the interposition of my own body. They cannot imagine why there should be any reason why they should not handle it. There are signs upon this weight that it has lost part of its value. It is a matter of national importance that this weight should be compared with something so that we may know what its values are.

The motion was carried.

The PRESIDENT.—The report of the Committee on Compression of Cements and Settlement of Masonry is now in order.

Mr. FRANCIS COLLINGWOOD (Chairman).—The Committee has not been able to have any meeting during the past year, and they have had no command of apparatus to make the necessary experiments. Owing to the fact that it has been impossible to accomplish anything, it has been decided that we shall report to that effect, and ask that the Committee be discharged. There is considerable work remaining for such a committee to do, but it must be done by somebody who has the necessary time to expend upon it and the requisite apparatus.

The PRESIDENT.—I understand the Chairman of the Committee to submit a motion that the Committee be discharged.

Mr. COLLINGWOOD.—Yes, sir.

The PRESIDENT.—It is moved that the Committee on Compression of Cements and Settlement of Masonry be discharged for the reasons given by the Chairman.

The Committee was discharged.

The President called for the report of the Committee on Uniform Methods for Tests of Materials used in Metallic Structures.

The SECRETARY.—I am requested by Mr. J. G. Dagron, a member of that committee, who has been called away, to say briefly that the Committee wish simply to report progress, and ask to be continued. They have commenced their work, but it has not proceeded far enough to present any data of progress.

On motion, the Committee was continued.

The PRESIDENT.—The report of the Committee on Standard Rail Sections is next in order.

The Secretary read the report, and said: the Committee ask to be continued.

A motion to that effect was made.

The PRESIDENT.—It is moved that the report of the Committee be accepted, and the Committee continued.

Carried.

The President called for the report of the Committee on Impurities of Domestic Water Supplies, which was read by the Secretary.\*

Mr. A. FTELEY.—I believe it is necessary that I should add a few words to the report. This is a question which covers a very large ground. Those who have had something to do with public water works know what suffering and anxiety there has been in regard to impurities of water supplies. The State of Massachusetts has done some magnificent work in this direction; I do not believe anything better can be done; but within my own experience I have found that although their experiments cover a large amount of ground, yet the experience of others in different parts of the country is entirely different; and that in order to get some reliable results it would be for the best interests of all, if in some way the results of the observations of all could be concentrated in the hands of one body, which could classify them and give to the profession the benefit of the experience of all. It was in view of this result that the Committee was created. The Committee presented a report which was hardly anything more than a report of progress. As the report tells you, the Chairman of the Committee resigned before anything had been done, and I joined the Committee only late in the year. I am sorry to say that I am the only one of the Committee here, and those who could tell you better what the Committee have been doing are not here.

You have heard the instructions that the Board of Direction gave to the Committee for this work under the direction of the Society. Those

---

\* Printed at the end of the Proceedings.

instructions are now void, for the simple reason that during the time that there was not a chairmanship of this Committee, another organization, the American Association of Water Works, had created a Committee of exactly the same kind, and have corresponded with a great many water works and boards of health in the country. When I joined the Committee, I thought the best thing would be to see what these gentlemen had done, so that we should not simply repeat what they had done. We had an exceedingly pleasant meeting with the representatives of the Water Works Association, and we learned from them that they had tried to do exactly what the Board of this Society had instructed the Committee to try to do. They have been in correspondence with different parts of the country where troubles have occurred. Samples of water have been sent to be analyzed, and some exceedingly interesting communications, which certainly conveyed new ideas, have been received; but they have found it impossible to take this information and work it out into such shape as to get any tangible results. The ground is too vast for that. It has occurred to the Committee that the only good they could do would be this, to abandon first the idea of corresponding with these various bodies and getting results which should be shaped and put together. The subject is too vast. They thought that the only thing to do, if it could be done, would be to correspond with these various bodies who are interested in the purity of water supplies, and ask them whether they could pledge themselves to contribute a small amount of money toward a general fund, in order to create a central bureau, which could receive all these various results, classify them, work them up and get some results. You understand that it is very far from the idea of your Committee to suppose that the Society will have anything to do with the collection of funds, or anything of that kind. The idea is simply to agitate the question, and see whether enough people can be gotten to contribute a little money and form a central bureau, which should appoint its own committee and its own officers; in short, to have a center to which inquiries and communications could be sent, which could take results and work them up and publish them. We all know that it is a very difficult task. We recognize the fact that there are nine chances against one that the effort will be a failure; but the subject is of such prominent interest that it seems that the Committee should at least try to see if they can do anything of the kind. At any rate, the Society will have agitated the subject; and it seems to me that

the Society, as a scientific body, will have done its duty in trying to produce these results.

I would propose the following resolution:

*Resolved*, That the report be accepted and the Committee continued.

The motion was carried.

I would move next:

*Resolved*, That it be left to the discretion of the Committee whether, after conferring further with the Committee of the American Water-Works Association, it would be better to associate with them, or that the Committee of your Society work alone in this matter.

The PRESIDENT.—It is moved that it be left to the discretion of the Committee whether it will unite with a committee of the American Water-Works Association, or whether it will work alone.

The motion was carried.

The President asked for the report of the Committee on an International Engineering Congress, which was read by the Secretary.\*

The PRESIDENT.—The first action to be taken on this report will be the adoption of a motion to accept the report and discharge the Committee.

A motion to this effect was made and carried.

The PRESIDENT.—I wish to say, in my late capacity as Chairman of this Committee, that there was a considerable attendance at that Convention, the fifteen societies represented being as given in the report subjoined to the Committee report. It was apparent to your Committee that there was going to be a movement of this character whether we joined it or not. It was the opinion of the Committee that it would not be desirable to let such a movement go on without this Society being identified with it. It was our belief that the Society would wish to have headquarters in Chicago during the Exposition; and as it would cost very much less to establish those headquarters jointly than to maintain them alone, and as nearly, if not quite, all of these other societies named were going into the movement, it would not be best for your Society to hold back; hence the recommendations of the Committee, which I will ask to have acted upon *seriatim*.

*First*—We recommend that the action of said meeting be approved by this Society, subject to further and specific approval by the Board of Direction of this Society of such financial plan as may be hereafter adopted.

The Committee did not feel warranted in committing the Society, or

---

\* Printed at the end of the Proceedings.



recommending that the Society should commit itself, to the financial plan suggested, and therefore that any action taken by this meeting should be subject to the specific approval of the Board of Direction hereafter. A motion on that proposition would be in order.

Mr. FTELEY.—I move the adoption of this recommendation.

The motion was carried.

The PRESIDENT.—The other recommendation is:

That the Society appoint two Members to represent it on the Permanent Committee, with two alternates who may act as such representatives during the absence or disability of the principals.

As this Committee is appointed to continue some two and a half years, until the close of the Exposition, it seemed desirable that there should not only be two members of the committee, but there should also be alternates. It will be noticed in the scheme of the Joint Committee that it is proposed that this Permanent Committee shall consist of two members of each of the principal national societies, and one member only of the local societies, so that this Society would be represented on the Joint Committee by two members.

A motion upon that recommendation would be in order.

A MEMBER.—I move that the recommendation be adopted.

The motion was carried.

Mr. WOODBURY.—I move that the appointment of the committee referred to, be referred to the Board of Direction with power to act.

The reason I make this motion is that it will require some care in the selection of the individuals who can attend to the duties of the Committee. (Seconded.)

The PRESIDENT.—That is just what I intended to suggest, that it was eminently proper that the incoming Board should deal with that matter.

The motion was adopted.

The PRESIDENT.—The next business in order will be the subject of the next Annual Convention, time and location.

The Secretary read a list of places suggested by the replies to the Convention circular as follows: Chicago, 17; Detroit, 11; New York, 10; Boston, 10; Chattanooga, 9; San Francisco, 9; Cincinnati, 6; Ithaca, 6; Cleveland 6; White Sulphur Springs, 5; St. Louis, 5; Birmingham, 5; Buffalo, 5; Philadelphia, 5; Roanoke, 4; Louisville, 4; Baltimore, 3; Atlantic City, 3; Atlanta, 3; Duluth, 3; Lake George, 3; Pittsburgh, 3;

Saratoga, 3; Chatauqua Lake, 3; Washington, 3; Newport, 3; Old Point Comfort, 3; Asheville, 2; Thousand Islands, 2; Portland, Me., 2; Denver, 2; Helena, Mon., 2; Montreal, 2; Mackinac, 2; Bar Harbor, 2; Kansas City, 2; Norfolk, 2; Niagara, 2; Mexico, 2. The following one each: New Haven, Hartford, Shelter Island, Cape May, Tacoma, Cresson, Altoona, Deer Park, Blue Mountain, Md., Middlesboro, Ky., on New Jersey Coast, Long Branch, Glen Summit on line of Lehigh Valley R. R., Pittsfield, Nicaragua, in the Selkirks on line Canadian Pacific Ry., Nashville, Paul Smith's, Tacoma, Moosehead Lake, Lookout Mountain, Anniston, Galveston, Richmond, St. Paul, Newport News, Burlington, Vt., Pueblo, Albany, West Point, Glasgow, Va., Hoboken, some place south 37 degree parallel and east of Mississippi.

Mr. FTELEY.—I move that the decision of the time of and best place for the next Convention be left to the incoming Board.

Carried.

The PRESIDENT.—Has any Member present anything further to offer?

I will take this opportunity to congratulate the Society on having gotten through with a vast amount of very important work to-day, in what I think must be to the Members present a very satisfactory manner. It has looked during the last two or three months as though the Society was approaching a crisis in its affairs. There were some, I think, who believed that the Society was on the verge of ruin. I am happy to say that it is the belief of a number that the action here to-day has demonstrated that there is no danger at the present time of the Society going to wreck.

A substantial interest has been shown by the membership in the questions which have come before the Society. The subjects have been fairly considered and acted upon, and I believe that the Society is not only not going to ruin, but that it is about to enter on an era of greater prosperity, of larger growth, and of great satisfaction to the membership. I congratulate you, gentlemen, on the present situation.

Mr. CROES.—Is there any business before the house now?

The PRESIDENT.—No further business, but there is a lecture to be delivered which will be a part of this meeting.

Mr. CROES.—Before this meeting adjourns, and the many Members now present from all parts of the country have separated, I should like to make a motion. As the President has well remarked, we have been passing through what has appeared to a great many Members to be a

crisis in the affairs of the Society, and there has been effected to-day, by the votes that have been counted, a change in the *personnel* of the management which I think calls for some notice from the Society.

For thirteen years, a period of time which is very long to look forward to, but not so long in retrospect, we have been under the control of Boards of Direction, varying in their *personnel*, except in one respect (that of the Secretary) who has held office during this whole period, which has been a period of growth, a period of prosperity, which I think is unequaled by that of any other society of like standing in the world, and which I think is not likely to be excelled in the future, all things being considered. It seems therefore proper that on the occasion of the retirement of this officer, who has served us so well and so long, who has produced by his efforts and by his management such excellent results, one whose action has been approved by so many different Boards of Direction, coming in, some of them, with antagonistic ideas, but always retiring unanimous in their support of the Secretary of the Society, we should express the thanks of the American Society of Civil Engineers to the retiring Secretary, who has served us so well and so faithfully; and I move that the thanks of the American Society of Civil Engineers be extended to Mr. John Bogart for the faithful and efficient manner in which for thirteen years as Secretary, and five years previous as a member of the Board of Direction, he has served the interests of the Society.

The PRESIDENT.—Gentlemen, you have heard the motion of Mr. Croes. It is not necessary for me to add anything to what Mr. Croes has said, but it would seem proper for me, from my position in the chair, to say that my two years' service in the Board, the last year being in the capacity of your President, have satisfied me of the invaluable services rendered by Mr. Bogart to the Society during the many years he has devoted himself to its interests; and while I feel that he will find more profitable employment for his talents, and while this may be as good a time as any for him to separate himself from the Secretaryship of the Society, I am sure that it is a step that he has always found it hard to take, and I am equally sure that to a very large proportion of the membership it is a step which they very much regret to have him take.

The motion was unanimously adopted by a rising vote, amid great applause.

The SECRETARY.—I am requested to ask those gentlemen who will

take the excursion to-morrow morning to the Mott Haven Signal Station on the New York Central Railroad, being in charge of Mr. Voorhees, to signify that by rising. Mr. Voorhees will be informed by telegraph, so that he can make the proper arrangements.

The Secretary made some other announcements as to the excursions of the morrow.

The PRESIDENT.—Mr. J. F. O'Rourke, Member of the Society, will give a description of the work in progress on the Chignecto Ship Canal, illustrated by the stereopticon.

Mr. FTELEY.—Mr. President, I wish to refer for a moment to the remark that you made a little while ago, to the effect that you congratulated this meeting on the fact that it had gotten through with so much business to-day. When I for a moment took the chair this morning in your absence, I was appalled by the amount of business before us, and if we have got through satisfactorily at a comparatively early time, I must say it is due mostly to the ability with which the President has conducted the proceedings; and I wish to say the thanks of the Society are due to him for the eminent ability he has shown as the presiding officer.

I move that the thanks of the Society be tendered to the Chairman.

The SECRETARY.—Gentlemen, you have heard the motion of Mr. Fteley; all those in favor will manifest it by a rising vote.

It is unanimous.

The PRESIDENT.—Gentlemen, I am sure I thank you for this expression. I recognized myself this morning that there was a great deal to be done, and unless it was done in a very systematic and efficient way it would not be done at all; and if I have seemed to be somewhat determined in enforcing rules of order, I hope you will excuse me for the sake of the necessity which seemed to exist for getting along with the work. I can equally thank you for the support you have given me during the brief time I have presided over your deliberations.

Mr. O'Rourke then presented the subject of the Chignecto Ship Canal work, illustrating it by stereoscopic views, after which the Society adjourned.

The paper will be printed in the Transactions.

On Thursday, January 22, the members went, in two parties, one under the charge of Mr. Theodore Voorhees, M. Am. Soc. C. E., General Superintendent N. Y. C. & H. R. R., by special train to Mott Haven, to examine the operation of the new Pneumatic Interlocking Signal

apparatus and the heavy masonry there building ; this party joined the other later. The main party visited, first, the new *World Building*, by invitation of Mr. Geo. B. Post, the architect, and Mr. J. Pulitzer, the owner; thence, by the courtesy of Mr. C. C. Martin, M. Am. Soc. C. E., Chief Engineer of the Bridge, and Col. Fred. Martin, General Manager of the Elevated road, to the Flatbush Avenue sewer, where the Anderson & Barr system of tunneling was examined under the guidance of Mr. Anderson; thence by train to the Ridgewood Pumping Station, by invitation of Mr. Robert Van Buren, M. Am. Soc. C. E., where the new and old pumping engines and the well-system were inspected.

Returning to New York, one party visited the Hudson River tunnel at the Hoboken end, by invitation of Mr. Wm. R. Hutton, M. Am. Soc. C. E. A second party went to Jersey City, and inspected the terminal work of the Pennsylvania Railroad, by invitation of the engineer of the work.

In the evening, a reception was given at the Society house.

The members of the Society, of the various classes, 263 in number, present at the Annual Meeting, excursions, etc., were: John W. Bacon, Frederick H. Baldwin, William J. Baldwin, Charles B. Ball, Charles J. Bates, Arthur Beardsley, Max J. Becker, John A. Bense, Frederick S. Benson, Van Brunt Bergen, Charles E. Billin, George H. Bishop, H. Bissell, G. H. Blakeley, John Bogart, Alfred P. Boller, George M. Bond, Charles P. Bonnett, Adolphus Bonzano, William F. Booth, John B. Bott, P. F. Brendlinger, Jules Breuchaud, Josiah A. Briggs, Alex. G. Brinckerhoff, H. Waller Brinckerhoff, D. S. Brinsmade, Frederick Brooks, Charles O. Brown, Thomas E. Brown, Jr., Frank Bruen, Kennerley Bryan, Andrew Bryson, L. L. Buck, William D. Bullock, Harry D. Bush, Robert Cartwright, O. Chanute, Samuel H. Chittenden, L. Russell Clapp, St. John Clarke, Thomas C. Clarke, Edward B. Codwise, Mendes Cohen, Francis Collingwood, Oren B. Colton, Alfred G. Compton, S. L. Cooper, Theodore Cooper, Joseph P. Cotton, George H. Crafts, Alfred Craven, R. Walter Creuzbaur, J. James R. Croes, Horace Crosby, J. Foster Crowell, F. S. Curtis, James G. Dagron, Frank G. Darlington, Chandler Davis, Joseph P. Davis, Rob B. Davis, E. P. Dawley, Charles H. Deans, John Sterling Deans, E. E. de Lancey, George Devin, S. L. F. Deyo, Stanciff B. Downes, Thomas Egleston, Charles E. Emery, Herbert C. Felton, John W. Ferguson, Clark Fisher, Francis Davis Fisher, J. Foster Flagg, Sandford Fleming, A. Prescott Folwell, John D. Fouquet, Louis D. Fouquet, Henry N. Francis, James B. Francis, John R. Freeman, Arthur J. Frith, George H. Frost, A. Fteley, J. R. Furman, William Gibson, Jr., Bryant Godwin, Charles S. Gowen, Charles H. Graham, Samuel M. Gray, William Gray, Bernard R. Green, F. V. Greene, George S. Greene, George S. Greene, Jr., Joseph N. Greene, Stephen S. Haight, William G. Hamilton, E. P. Hannaford, George R. Hardy, E. W. Harrison, Charles M. Harris, Robert L. Harris, Bentley



D. Hasell, Wm. J. Haskins, Chas. H. Haswell, Jas. D. Hawks, C. W. Hazelton, Rudolph Hering, Albert B. Hill, S. Willet Hoag, Jr., Frank W. Hodgdon, Henry S. Holt, John Houston, Edward W. Howe, R. L. Hoxie, Alfred E. Hunt, Chas. W. Hunt, Robt. W. Hunt, Wm. R. Hutton, J. B. Johnson, S. J. Johnson, A. Langstaff Johnston, Geo. A. Just, Gustav Kaufman, Herbert C. Keith, Wm. D. Kelley, Jr., Cassius W. Kelly, C. S. Kelsey, Aug. S. Kibbe, George A. Kimball, Paul S. King, Joseph M. Knap, Gustav Lehlbach, G. Leverich, James F. Lewis, Gustav Lindenthal, A. W. Locke, Horace Loomis, L. F. Loree, Thomas D. Lovett, Charles Macdonald, William W. Maclay, Arthur Macy, Edward E. Magovern, Henry Manley, Charles C. Martin, Thomas H. McCann, David E. McComb, Thomas J. McMinn, T. H. McKenzie, George W. McNulty, William Metcalf, Henry C. Meyer, Curtiss Millard, Edwin Mitchell, Henry G. Morris, James Moylan, Charles H. Myers, E. T. D. Myers, C. E. Newham, O. F. Nichols, Edward P. North, Ellis B. Noyes, A. S. Nye, Jr., F. S. Odell, L. F. Olney, John F. O'Rourke, Frank C. Osborn, Joseph O. Osgood, John A. Ostrom, James Owen, A. B. Paine, W. Barclay Parsons, John A. Partridge, P. A. Peterson, George W. Plympton, Henry G. Prout, George S. Rice, Joseph R. Richards, Palmer C. Ricketts, Clinton L. Riggs, E. P. Roberts, Percival Roberts, Jr., William Roberts, Thomas Rodd, Charles C. Rose, James Ross, Charles L. Rowland, Thomas F. Rowland, Jr., William Rumble, G. M. Rusling, J. Gardner Sanderson, Charles C. Schneider, Henry B. Seaman, William H. Searles, Ira A. Shaler, George W. Sherwood, William P. Shinn, Reuben Shirreffs, Arthur L. Shreve, G. F. Simpson, Albert M. Smith, Joseph S. Smith, Oberlin Smith, T. Guilford Smith, Charles SooySmith, Julio F. Sorzano, John H. Staats, Robert P. Staats, C. W. Staniford, Robert B. Stanton, A. B. Starr, D. McN. Stauffer, John M. Stewart, Cook Talcott, Gaylord Thompson, S. C. Thompson, George H. Thomson, John Thomson, M. M. Tidd, George C. Tingley, Calvin Tomkins, Stevenson Towle, E. E. Russell Tratman, John C. Trautwine, Jr., L. L. Tribus, W. G. Triest, John D. Van Buren, Robert Van Buren, John G. Van Horne, I. M. de Varona, Theodore Voorhees, J. A. L. Waddell, Montgomery Waddell, W. W. Walker, Lebbeus B. Ward, Charles D. Ward, R. Willard Ware, Charles S. Warner, F. W. Watkins, Albert L. Webster, Edward Wegmann, Jr., A. M. Wellington, Nelson J. Welton, Edward B. Weston, William C. Wetherill, E. S. Wheeler, H. R. Wheeler, Schuyler S. Wheeler, S. Whinery, Thomas D. Whistler, W. Howard White, Frank W. Whitlock, Frank O. Whitney, William H. Wiley, S. Wimmer, C. J. H. Woodbury, William E. Worthen, H. W. York and A. J. Zabriskie.

# REPORT OF THE BOARD OF DIRECTION FOR THE YEAR ENDING DECEMBER 31st, 1890.

PRESENTED AT THE ANNUAL MEETING, JANUARY 21st, 1891.

The Board of Direction, in compliance with the provisions of the Constitution of the Society, presents its Report for the year ending December 31st, 1890.

## MEMBERSHIP.

At the present date, January 1st, 1891, the membership is as follows:

Honorary Members, resident..	4	Non-resident...	3	Total.	7
Corresponding Members.....	—	"	... 3	"	3
Members, resident.....	200	"	... 880	"	1 080
Associates, " .....	17	"	... 44	"	61
Juniors, " .....	57	"	... 158	"	215
					<u>1 356</u>
Making, resident.....	278	Non-resident..	1 088		<u>1 366</u>
Total .....					1 366

Fellows, 56, of whom 5 Members are included above, leaving..... 51

Subscribers to the Building Fund, 140, of whom 83 are entered in  
one or other of the above classes, and 19 are deceased, leaving 38

Total connected with the Society, January 1st, 1891.....1 455

At the date of the last report, January 1st, 1890, the membership was as follows :

Honorary Members, resident..	5	Non-resident..	3	Total...	8
Corresponding Members.....	—	"	3	"	3
Members, resident.....	180	"	830	"	1 010
Associates, " .....	16	"	39	"	55
Juniors, " .....	39	"	130	"	169
					<u>1 245</u>
Making resident.....	240	Non-resident..	1 005	Total...	1 245

Fellows, 56, of whom 5 Members are included above, leaving.... 51

Subscribers to the Building Fund, 140, of whom 85 are entered in  
one or other of the above classes, and 16 are deceased, leav-  
ing..... 39

Total connected with the Society, January 1st, 1890.....1 335

The additions during the past year have been:

Honorary Members .....	
Members .....	87
Associates .....	6
Juniors.....	56
Fellows.....	1
Total additions.....	<u>150</u>

The decrease during the year in each class has been :

Honorary Members..Died 1 .....	1
Members .....	“ 15 Resigned, 2..... 17
Juniors.....	“ — “ 1 Transferred to Member, 8
	“ “Associate, 1 10
Fellows.....	“ 1 .....
Subscribers .....	“ 1 .....
Totals: Deaths, 18; Resignations, 3; Transfers, 9. Total.....	<u>30</u>

There has thus been an addition of 150, and a decrease of 30, making actual net increase during the year, 120.

On January 1st, 1890, there were, as stated in the last Annual Report, 54 proposals pending. One hundred and sixty-five proposals have been received during the year; 92 candidates have been elected Members, of whom 8 were transferred from Juniors; 6 candidates have been elected as Associates, of whom 1 was transferred from Junior; 54 candidates have been elected Juniors; 1 candidate has been elected a Fellow.

Eighty-seven persons have during the year qualified as Members; 6 have qualified as Associates; 56 have qualified as Juniors; 1 has qualified as Fellow; 12 candidates elected during the year as Members, and 3 as Juniors, have not yet qualified. There are 29 proposals now pending.

It may be noticed that while 54 proposals were pending at the beginning of the year, and 165 have been received during the year, there have been but 153 elections to all classes, and that 29 proposals are still pending.

There have been eight rejections of candidates by the Society on the letter-ballots. The remainder of the difference between the proposals received and the elections to one or another grade is due to the continu-

ance of the system adopted by the Board of Direction, of insisting that the record of every candidate shall show the qualification demanded by the Society laws for admission to the suitable classification before going to ballot. When any doubt exists as to the proper action upon a proposal, enquiries are made of Members who may be able to give information.

The attention of Members is again called to the importance of availing themselves of the opportunity given by the advance notices of candidacy (the bluelists), for information as to all applications for membership, and also the duty that is incumbent upon every Member to give to the Board any information as to the candidates that may aid in securing proper action upon the applications.

It has been the constant effort of the Board to maintain the standard for the different classifications of connection with the Society. Success in this must largely depend upon the action of Members in giving information to the Board.

#### THE TRANSACTIONS.

The Transactions of the Society during the past year have been issued in two volumes, and contain 794 pages and 158 plates. The Proceedings, as heretofore, have been issued in one volume, and contain 235 pages.

The Index to the Transactions from their first issue to the present year has been made by Mr. John Bogart, M. Am. Soc. C. E. Advance proofs of this index have been in the hands of a number of Members, and acknowledgment is made for valuable suggestions made in regard to it at the time of the Annual Convention as well as at other times.

The Library has been increased during the year by the following additions:

Books and pamphlets.....	322
Maps, plans, drawings, charts, photographs and engravings.....	178

The Society has lost by death, during the term covered by this report one Honorary Member: William J. McAlpine; fifteen Members: Charles Ackenheil, Theodore Allen, William H. Atwood, Morris S. Belknap, O. E. Cushing, J. L. Gillespie, Fred. Graff, B. H. Greene, Samuel Keefer, William B. Knight, F. A. Sears, O. E. Michaelis, William H. Paine, F. Floyd Weld and Thomas J. Whitman; one Fellow: F. C. Lowthorp.

## MEETINGS OF THE SOCIETY.

Twenty-one meetings of the Society were held during the year, one of which was the Annual Meeting, held in New York, January 15th and 16th, and another, the Annual Convention, held at Cresson, Pa., June 26th—July 1st. All the sessions of the Convention, including the business meeting, being counted as one meeting of the Society.

Thirteen meetings of the Board of Direction have been held during the year.

## THE NORMAN MEDAL.

A Gold Medal of the value of seventy dollars, and the Rowland Prize of fifty dollars, have been awarded as shown by the following list. The reports of award for the past year will be announced at this meeting.

1874. Medal awarded to J. James R. Croes, for paper on "Construction of a Masonry Dam."

1875. Medal awarded to Gen. Theodore G. Ellis, for paper on "Description and Results of Hydraulic Experiments with large Apertures."

1877. Medal awarded to William W. Maclay, for paper on "Notes and Experiments on the Use and Testing of Portland Cement."

Book Prize awarded to Julius H. Striedinger, for paper "Igniting Blasts by means of Electricity."

1879. Medal awarded to Edward P. North, for paper "The Construction and Maintenance of Roads."

Book Prize awarded to Max E. Schmidt, for paper on "The South Pass Jetties."

1880. Medal awarded to Theodore Cooper, for paper on "The Use of Steel for Bridges."

1881. Medal awarded to L. L. Buck, for paper on "The Re-enforcement of the Anchorage and Renewal of the Suspended Structure of the Niagara Railroad Suspension Bridge."

1882. Medal awarded conjointly to Messrs. A. Fteley and F. P. Stearns, for paper on "Experiments on the Flow of Water in the Sudbury River."

1883. Medal awarded to William P. Shinn, for paper on "The Increased Efficiency of Railways for the Transportation of Freight."

ROWLAND PRIZE awarded to G. Lindenthal, for paper "Rebuilding the Monongahela Bridge."



1884. Medal awarded to James Christie, for paper on "Experiments on the Strength of Wrought Iron Struts."
- ROWLAND PRIZE awarded to Hamilton Smith, Jr., for paper "Water Power with High Pressures and Wrought Iron Water Pipe."
1885. Medal awarded to Eliot C. Clarke, for paper on "Record of Tests of Cement Made for the Boston Main Drainage Works."
- ROWLAND PRIZE awarded to A. M. Wellington, for paper "Experiments with New Apparatus on Journal Friction at Low Velocities."
1886. Medal awarded to Edward Bates Dorsey, for paper "English and American Railroads Compared."
- ROWLAND PRIZE awarded to Charles C. Schneider, for paper "The Cantilever Bridge at Niagara Falls."
1887. Medal awarded to Desmond FitzGerald, for paper on "Evaporation."
- ROWLAND PRIZE awarded to Wm. Metcalf, for paper on "Steel; its Properties; its Use in Structures and in Heavy Guns."
1888. Medal awarded to E. E. Russell Tratman, for paper on "English Railroad Track."
- ROWLAND PRIZE awarded to Clemens Herschel, for paper "The Venturi Water Metre; An Instrument making use of a New Method of Gauging Water, applicable to the cases of very large Tubes, and of small value only, of the Liquid to be Gauged."
1889. Medal awarded to Theodore Cooper, for paper on "American Railroad Bridges."
- ROWLAND PRIZE awarded to James D. Schuyler, for paper on "The Construction of the Sweetwater Dam."

#### REVISION OF THE CONSTITUTION.

The Committee appointed to consider a Revision of the Constitution and By-Laws of the Society presented in November, 1889, a report of progress and a Codification of the then existing Constitution and By-Laws, with no Amendments, except as to the Amending Clause. This Codification was duly adopted by letter-ballot, and is now the Constitution of the Society.

The Committee also duly submitted, on the first Wednesday of November, 1890, a fully revised Constitution, and this revision with the

report of the Committee has been mailed to the Members, and will be in order for consideration at this meeting.

The Board of Direction asks the serious attention of the Members of the Society to this report and revision. The Committee has given the subject the most earnest, careful and continued consideration.

By order of the

Board of Direction,

JOHN BOGART,

*Secretary.*

# REPORT OF THE TREASURER FOR THE YEAR ENDING DECEMBER 31st, 1890.

## RECEIPTS.

### Balance on hand December 31, 1889:

Fund for Enlarged Building.....	\$3 845 50	
Fellowship Fund.....	526 46	
General Fund.....	6 552 49	
	<hr/>	\$10 924 45
Entrance Fees.....	\$3 620 00	

### Current Dues:

From 113 Resident Members.....	\$2 720 00	
“ 577 Non-resident Members.....	8 445 00	
“ 10 Resident Associates.....	150 00	
“ 24 Non-resident Associates.....	225 00	
“ 33 Resident Juniors.....	450 00	
“ 116 Non-resident Juniors.....	1 090 00	
	<hr/>	\$13 080 00

### Past Dues:

From 13 Resident Members.....	\$350 00	
“ 45 Non-resident Members.....	745 00	
“ 1 Non-resident Associate.....	10 00	
“ 1 Resident Junior.....	7 50	
“ 7 Non-Resident Juniors.....	65 00	
	<hr/>	1 177 50

### Dues for year beginning January, 1891:

From 38 Resident Members.....	\$950 00	
“ 165 Non-resident Members.....	2 460 00	
“ 4 Resident Associates.....	60 00	
“ 4 Non-resident Associates.....	40 00	
“ 14 Resident Juniors.....	210 00	
“ 15 Non-resident Juniors.....	145 00	
	<hr/>	3 865 00
	<hr/>	18 122 50
From sales of Publications.....	1 345 42	
“ Certificates of Membership.....	166 50	
“ Advertisements.....	917 00	
“ Interest on Pennsylvania Gen. Mort. Bonds.....	\$660 00	
“ “ City New York Croton Aqueduct Stock....	70 00	
“ “ Chicago Northwestern Railroad Bond....	50 00	
“ “ Consolidated Gas Stock.....	50 00	
“ “ Union Trust Company Deposit.....	65 87	
“ Rebate on Taxes.....	3 15	
	<hr/>	899 02
Compounding Dues.....	500 00	
From Fellowship Fees.....	150 00	
“ Other sources.....	9 50	
	<hr/>	25 729 94

---



---



---

## DISBURSEMENTS.

Interest on Mortgage.....	\$800 00
Taxes.....	453 10
Publications.....	13 614 61
Stationery and Printing.....	1 106 16
Postage.....	2 826 56
Library.....	1 193 16
Salaries.....	3 000 00
Convention and Annual Meeting.....	1 347 39
Janitor, House Supplies, Fuel, Water and Gas.....	1 484 37
Certificate of Membership.....	115 25
Insurance.....	54 62
Rowland Prize.....	58 00
Finance, Treasurer's Books, Accounts, Collections.....	1 200 00
Work of Committees.....	667 66
Improvements on Society House.....	162 80
Other expenditures.....	579 85
	<hr/>
	\$28 663 53
Payment for Enlargement of Society House.....	5 425 50
Balance in Bank and Trust Company.....	2 565 36

---

\$36 654 39

---

The Funds of the Society are as follows:

Fellowship Fund:

Ninety-four subscriptions to December 31, 1889.....	\$10 250.00
Premium and accumulated interest, December 31, 1889	1 388.28
	<hr/>
Fund on hand December 31, 1889.....	\$11 638.28
One subscription during 1890.....	150.00
Interest received during 1890.....	550.00
	<hr/>
	\$12 338.28
Expended for publications during 1890.....	550.00
	<hr/>
	\$11 788.28
	<hr/>

The present investment of this Fund is:

Nine Pennsylvania Railroad General Mortgage Bonds, cost.....	\$11 111.82
Part of one Chicago and Northwestern Bond, Five per cent., cost.....	676.46
	<hr/>
	\$11 788.28
	<hr/>

Norman Medal Fund:

One Certificate Croton Aqueduct Stock, New York City.....	\$1 000.00
	<hr/>

Building Fund:

Receipts previous to December 31, 1885.....	\$17 842.00
	<hr/>

Expended:

For Payment on Purchase of Property.....	\$14 000.00
For Improvement on Property.....	3 486.97
For Legal Services, Circulars, etc.....	355.03
	<hr/>
	\$17 842.00
	<hr/>

Fund for Enlarged Building:

Receipts from subscriptions.....	\$8 029.50
Expended on Enlargement.....	8 029.50
	<hr/>



## Rowland Prize Fund:

One Pennsylvania Railroad General Mortgage Bond, Six per cent., cost.....	\$1 222.50
--	------------

## Compounding Fund:

Two payments @ \$325....	\$650.00
Six       “       @ 250. ....	1 500.00
	<u>\$2 150.00</u>

## The present investment of this Fund is:

One Pennsylvania Railroad General Mortgage Bond, Six per cent., cost.....	\$1 222.50
Part of one Chicago and Northwestern Five per cent. Bond, cost (balance of this Bond in Fellowship Fund).....	358.54
Part of ten Shares Consolidated Gas Company of New York, cost.....	568.96
	<u>\$2 150.00</u>

## General Fund:

Part of ten Shares Consolidated Gas Company of New York, cost.....	\$403.54
---	----------

Respectfully submitted,

G. S. GREENE, JR.,

*Treasurer.*

## ANNUAL REPORT OF THE SPECIAL COMMITTEE ON UNIFORM STANDARD TIME.

---

PRESENTED JANUARY 21ST, 1891.

---

The Special Committee on Uniform Standard Time begs leave to report:

In the last annual report of the Committee it was brought to the notice of the Society that the Government of the United States had not taken any action on the resolutions and recommendations of the International Conference, held in Washington in 1884, and that as Standard Time, so universally adopted in civil life throughout North America, is in complete accord with the resolutions of the Conference, it would be in the public interests to have the recommendations authoritatively recognized by Act of Congress. The suggestions of the Committee having been accepted at the annual meeting, it was considered advisable to ascertain the views of the members generally. The Board of Direction accordingly submitted to letter-ballot the draft of a memorial, representing to the Government of the United States:

*First.*—That, in the opinion of this Society it would be in the general interests of the United States to accept formally the resolutions of the International Conference, held at Washington in 1884.

*Second.*—That, in the opinion of this Society, it would be in the general interests to legalize, by Act of Congress, the now common system of regulating time-reckoning by hour meridians.

*Third.*—That, in the opinion of this Society, it would be in the general interests to embrace in an Act of Congress a permissive clause, authorizing and legalizing the use of the 24-hour notation.

It was decided by letter-ballot on March 5th that the memorial should be adopted—226 voting “yea,” 7 voting “nay”; the majority in favor being 219. The memorial has since been duly forwarded to Washington and presented to the President of the United States, and to both Houses. A bill has likewise been prepared in accordance with the terms of the memorial, having in view the desired legislation. This bill has been presented and referred to committees in both Houses. A printed copy of the Senate Bill is appended hereto. (See Appendix No. 1.)

At the last annual meeting the Committee submitted a detailed statement establishing that a majority of the railway managers in the United States and Canada were in favor of the 24-hour notation. Evidence has since been received from officers of railways not before heard from, and the Committee is now enabled to report that the total number of railway authorities who have communicated directly with the Society,

expressing themselves in favor of the proposed change to the 24-hour notation of time, is as follows, viz.:

1. Presidents, Vice-Presidents and General Managers..	135
2. General Superintendents.....	77
3. Superintendents.....	114
4. General Traffic Managers.....	12
5. Engineers.....	65
Total.....	<u>403</u>

The aggregate length of railway with which these officers are connected is estimated at about 140 000 miles. A list, revised up to the present date, of railway managers in favor of the new notation of time is appended. (See Appendix No. 2.)

From these facts it is plain that the proposal to adopt the 24-hour notation in the working of railways on this continent, meets with general concurrence, and obviously what is required on the part of those who are responsible for the administration of the railway service of the country, to effect the desired change, is to act in accord, and by joint arrangement to fix upon some date when the new notation may be brought into general use for railway purposes. The Committee therefore respectfully recommends that the question of change, together with evidence of the harmony of opinion which prevails, be brought by this Society in a formal manner to the attention of the General Time Convention and the Board of Railway Presidents at their next periodical meetings.

The advantages of the 24-hour notation are beginning to be recognized in various branches of civil life. In hospitals, for example, to prevent mistakes by nurses in the administration of medicine, in recording temperatures, and in other matters, the new system is being gradually introduced; also in weather tables and in the recording of meteorological readings; indeed in departments where simplicity of system and accuracy is essential the new notation is being spontaneously brought into use in many quarters. For two or three years back the Canadian Almanac has abandoned the old notation and substituted the new. It is in connection with railway service, however, that the general introduction of the 24-hour notation may mainly be looked for, and the Committee cannot doubt that, thus brought into use, the intelligence of the community will welcome the change; the ready acceptance of "Standard Time" by the general public throughout the United States and Canada, directly on its adoption by the railway authorities, seven years ago, may be instanced. Although it cannot be expected that the 24-hour notation will so speedily come into common use, there are grounds for the belief that eventually it will prevail and become universal.

The Committee has the satisfaction to report that a communication has been received from the Director-General of Railways in India,

which gives official announcement of the fact that the 24-hour notation has recently come into use on all the railways throughout the Indian Empire, and that this result is partly in consequence of the satisfactory trial of the new system on some of the lines during the past few years.

The Committee has received the strongest assurances from all quarters that wherever the new notation has been adopted in the working of railways, it continues to give increased satisfaction. Experience has shown that the change can be effected with great ease, absolute safety and without creating any disturbing influence in any direction. When your Committee reported a year ago, the 24-hour notation was then in use on less than 4 000 miles of railway. It has now been permanently adopted on an aggregate length exceeding 20 000 miles.

The time-reform movement has for some years attracted much attention in Austria, Hungary, Germany, Italy, France and Belgium, and there is every prospect of the principle of Standard Time being adopted throughout Central Europe at an early day.

An official correspondence has been placed in the possession of the Committee which establishes that the British Government has taken steps which will tend to promote the general adoption of Standard Time and the 24-hour notation in all the British possessions. This correspondence can scarcely fail to be of interest to every member of this Society, inasmuch as we learn by it that the reform in time-reckoning which the American Society of Civil Engineers has taken a leading part in bringing to its present satisfactory condition, meets with the approval and hearty recommendation of the highest scientific authorities in the service of the British Government. The committee in England which has so favorably reported on the universal adoption of Standard Time and the 24-hour notation, consists of the Astronomer Royal, the Superintendent of the Nautical Almanac, the Hydrographer to the Admiralty, and the Secretary of the Science and Art Department, South Kensington, together with Professor Adams and General Strachey, both of whom were delegates at the Washington Conference of 1884.

A memorandum, prepared by a member of the Special Committee on Uniform Standard Time, setting forth the principles of time-reckoning long advocated by this Society, has been endorsed by these distinguished men, and recently has been sent by the British Government to the governments of all the British possessions around the globe, with a view to the adoption of Standard Time generally and of the 24-hour notation for railway time-tables. The railway companies of England, Ireland and Scotland have likewise been recommended to adopt the 24-hour notation. A copy of this document with its accompanying map is appended hereto. (See Appendix No. 3.)

In concluding this report, the Committee feels that it is not out of place to remark that, as the Members of this Society have in an important manner been associated with the construction of the great artificial

highways of commerce on this continent, it was eminently fit and proper that the American Society of Civil Engineers should take a prominent part in promoting a reform in time-reckoning, and in advancing a movement calculated to render the railway system more perfect, its administration more simple, and the railway service more safe to the general public. The Committee feels warranted in pointing out that the important results already secured are in a great measure attributable to the support and countenance given to the movement from the first days of its inception by this Society. It must likewise be obvious that the advantages yet to result will not be confined to the United States, to Canada or to this continent; that the beneficial influence of the American Society of Civil Engineers, in connection with a much-needed reform, which concerns all persons every moment of their lives, will be felt eventually in every civilized country.

This Committee was first appointed at the Convention of the Society held in Montreal in June, 1881. During these (nearly) ten years it has been the earnest endeavor of the members of the Committee to carry out the instructions with which they have from time to time been charged, and they trust they may be permitted to express the satisfaction felt by them with regard to the results so far accomplished. There only remains to complete the labors of the Committee the general introduction of the 24-hour notation throughout this country. There is a reasonable expectation that the reform is now on the eve of adoption in connection with the railways of the United States and Canada, and as that event would practically complete the object for which the Committee was originally appointed, they respectfully submit that the Committee may then with propriety be discharged.

The Committee avail themselves of this opportunity to express their deeply-felt thanks for the confidence which has invariably been reposed in them year by year.

Respectfully submitted,

SANDFORD FLEMING, *Chairman.*

CHARLES PAINE,

THOMAS EGLESTON,

JOHN M. TOUCEY,

*Members of Committee.*

Approved, William P. Shinn, President of the Society, *ex-officio* member of the Committee.



## APPENDIX No. I.

51ST CONGRESS,  
2D SESSION.

---

S. 4879.

## IN THE SENATE OF THE UNITED STATES.

JANUARY 16, 1891.

Mr. EVARTS introduced the following bill; which was read twice and referred to the Committee on the Judiciary.

---

## A BILL

Respecting the reckoning of time throughout the United States.

Whereas an act was passed in eighteen hundred and eighty-two to authorize the President of the United States to call an international conference to fix on and recommend for universal adoption a common prime meridian, to be used in the reckoning of longitude and in the regulation of time throughout the world; and

Whereas in pursuance of the said act a conference was held at Washington in eighteen hundred and eighty-four, at which twenty-six nations were represented by delegates duly appointed; and

Whereas the said conference, after prolonged deliberation, with substantial unanimity passed resolutions embodying the principles which should govern in the measurement and notation of time, and recommended the meridian passing through the observatory at Greenwich, England, as a prime meridian for all nations; and

Whereas the "hour meridian system," commonly called standard time, now in general use in the United States, is in accordance with the said resolutions and is based on the said prime meridian as an initial standard and has been found to be much to the advantage of interstate commerce; and

Whereas, since the general adoption throughout the United States of the mode of reckoning known as standard time, doubts have arisen as to the reckoning which has force in law, and it is expedient to remove all such doubts: Therefore,

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That time throughout the United States shall be reckoned in accordance with the hour meridian system, commonly called standard time, and the prime meridian recommended by the Washington International Conference of eighteen hundred and eighty-four shall be the initial standard for reckoning time; and the meridians which are a multiple*

of fifteen degrees from the prime meridian shall be the hour meridians or substandards by which the local reckoning of time shall be regulated; and the reckoning of time throughout the United States shall be in agreement with the reckoning of civil time on the prime meridian, excepting only with respect to the commencement of the day and the notation of the hours, which shall be as hereinafter provided; in all other respects the division and subdivision of the day into hours, minutes, and seconds in the United States shall be synchronous with the divisions and subdivisions of the day on the prime meridian.

SEC. 2. That the commencement of the day and the notation of the hours in different time sections of the United States shall differ from the commencement of the civil day and the notation of the hours on the prime meridian as follows:

(a) In the time sections where the reckoning of time is regulated by hour meridian number seventeen, or the substandard meridian which is seventy-five degrees west longitude, the reckoning shall be five hours behind the reckoning on the prime meridian.

(b) In the time section where the reckoning of time is regulated by hour meridian number eighteen, or the substandard meridian which is ninety degrees west longitude, the reckoning shall be six hours behind the reckoning on the prime meridian.

(c) In the time sections where the reckoning of time is regulated by hour meridian number nineteen, or the substandard meridian which is one hundred and five degrees west longitude, the reckoning shall be seven hours behind the reckoning on the prime meridian.

(d) In the time section where the reckoning of time is regulated by hour meridian number twenty, or the substandard meridian which is one hundred and twenty degrees west longitude, the reckoning shall be eight hours behind the reckoning on the prime meridian.

SEC. 3. That the time sections referred to in section two of this act embrace the country on each side of and contiguous to the substandard meridians therein mentioned; but it shall be competent for the constituted authorities of any State, city, incorporated towns or villages, or by the commissioner or courts of any county to adopt the substandard by which to reckon time, as shall seem to them most convenient, and such standard shall be legal and shall be recognized by the courts and officials of the United States; and the time for judicial, municipal, registration, or other purposes in any locality shall, unless otherwise specified, be held to be according to the reckoning so adopted and commonly used by the inhabitants of such locality.

SEC. 4. That the hours of the day may, in any locality, be numbered in a single series of numbers, from zero to twenty-four, and this method of designating the hours, commonly known as "the twenty-four hour notation," shall be equally valid with that of numbering the hours in two series of twelve hours each, distinguished as ante-meridian and post-meridian hours.

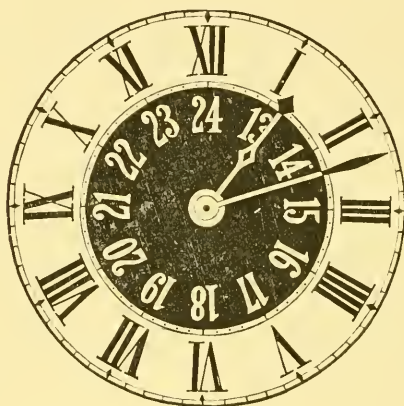
SEC. 5. That this act shall come into force on \_\_\_\_\_, anno Domini, eighteen hundred and ninety-one.

## APPENDIX No. 2.

## RAILWAY MANAGERS IN FAVOR

—OF THE—

## NEW NOTATION OF TIME.



The following is a list of railway men who have sent replies favoring the adoption of the 24-hour notation as soon as a considerable majority of railway authorities assent :

## THE LIST COMPRISES :

Presidents, Vice-Presidents and General Managers....	135
General Superintendents .....	77
Superintendents.....	114
Chief Engineers.....	65
General Traffic Managers.....	12
Total.....	<u>403</u>

A large number of prominent persons not connected with railways have also sent replies in favor of the new time notation. Only an exceedingly small percentage of all heard from in every quarter have expressed an opinion unfavorable to the change.

It has been suggested that the change should be effected simultaneously on all railways six months after an agreed date, which date may be chosen by the General Time Convention and the Board of Railway Presidents.

(List corrected up to January, 1891.)

NOTE.—The years given in the last column indicate the time suggested for effecting the change, in some of the replies received in 1889. The letter A in last column refers to list published in August, 1889; the letter B to list published in January, 1887; the letter C to list published in 1884.

Adirondack .....	C. E. Durkee.....	Supt.....	B
Alabama Midland.....	C. M. Craig.....	Asst. Engr.....	1891
Alleghany Valley.....	David McCargo.....	Gen. Supt.....	B
Arkansas Valley .....	H. Wood.....	Gen. Supt.....	A
Atchison, Topeka & Santa Fé.....	A. A. Robinson.....	Gen. Man.....	B
Atchison, Topeka & Santa Fé.....	D. I. Chase.....	Gen. Man.....	A
Atchison, Topeka & Santa Fé.....	Avery Turner.....	Supt.....	1891
Atchison, Topeka & Santa Fé.....	H. V. Hinckley.....	Off. Engr.....	1890
Atlantic Coast Line, Rich. Div.....	H. Walters.....	Gen. Supt.....	A
Atlantic Coast Line, Char. Div.....	John F. Divine.....	Gen. Supt.....	A
Atlantic & N. Carolina.....	W. Dunn.....	Supt.....	B
Atlantic & Pacific .....	S. W. Robinson.....	Eng. Brdgs.....	—
Baltimore & Ohio.....	S. Spencer.....	V. Pres.....	C
Baltimore & Ohio.....	G. B. Hazlehurst.....	Eng. Brdgs.....	1891
Baltimore & Ohio.....	James G. Dagron.....	Supt. Brdgs.....	1892
Beech Creek.....	A. G. Palmer.....	Supt.....	1891
Belaire, Zanesville & Cincinnati.....	W. R. Compton.....	Gen. Man.....	B
Bennington & Rutland .....	F. C. White.....	Gen. Supt.....	B
Boston, Hoosac Tunnel & West.....	C. A. Coombs.....	Gen. Man.....	A
Boston, Hoosac Tunnel & West.....	Chas. H. Covy.....	Supt.....	B
Boston, Barre & Gardner.....	H. H. Marshall.....	Supt. & Tr. Man.....	B
Boston & Lowell.....	C. S. Metten.....	Gen. Supt.....	B
Boston & Providence.....	Albert A. Folsom.....	Supt.....	B
Boston, R. Beach & Lynn.....	C. A. Hammond.....	Supt.....	B
Brazos & Northern.....	G. Y. Wisner.....	2nd V. Pres.....	1890
Brooklyn, Bath & C. I. ....	Geo. A. Gunther.....	Gen. Man.....	B
Brooklyn, Bath & West End.....	John P. Heindell.....	Gen. Supt.....	1892
Brunswick & Western.....	H. S. Morse.....	Gen. Man.....	B
Buffalo & Geneva .....	Paul S. King.....	Ch. Eng.....	1892
Buffalo, N. Y. & Phil.....	Geo. S. Gatchell.....	Gen. Supt.....	B
Buffalo, N. Y. & Phil .....	J. W. Watson.....	Supt.....	B
Buffalo, Rochester & Pittsburgh.....	G. W. Bartlett.....	Gen. Supt.....	1890
Burlington, Cedar Rapids & N.....	Robert Williams.....	V. P. & Supt.....	A
Burlington, Cedar Rapids & W.....	C. J. Ives.....	Gen. Supt.....	A
California Southern Ry.....	J. N. Victor.....	Supt.....	B
Canadian Government.....	C. Schreiber.....	Gen. Man.....	1890
Canadian Government.....	D. Pottinger.....	Chief Supt.....	1890
Canadian Government.....	P. S. Archibald.....	Chief Eng.....	1890
Canadian Government.....	J. E. Price.....	Supt.....	1890
Canadian Government.....	J. J. Wallace.....	Supt.....	1890
Canadian Government.....	A. R. Macdonald.....	Supt.....	1890
Canadian Pacific.....	W. C. Van Horne.....	President.....	1890
Canadian Pacific.....	T. G. Shaughnessy.....	Asst. Pres.....	1890
Canadian Pacific.....	George Olds.....	Gen. Tr. Man.....	1890
Canadian Pacific.....	Henry Beaty.....	Man. S. L.....	1890
Canadian Pacific.....	T. A. Mackinnon.....	G. Sup.O & A. Div.....	1890
Canadian Pacific.....	C. W. Spencer.....	Gen. Supt. E. Div.....	1890
Canadian Pacific.....	Wm. Whyte.....	Gen. Supt. W. Div.....	1890
Canadian Pacific.....	Harry Abbott.....	Gen. Supt. P. Div.....	1890
Canadian Pacific.....	W. T. Jennings.....	Eng. & Man. Cons.....	1890
Cape Fear & Yadkin Valley.....	J. S. Morrison.....	Gen. Supt.....	B
Cape Fear & Yadkin Valley.....	J. W. Fry.....	Gen. Supt.....	A
Catasauqua & Fogelsville.....	C. W. Chapman.....	Supt. & Eng.....	1891

Central of Georgia.....	M. S. Belknap.....	Gen. Man.....	A
Central of Georgia.....	Wm. Rogers.....	Gen. Supt.....	B
Central of Georgia.....	C. E. Marrin.....	R. Master.....	1892
Central Iowa Ry.....	D. P. Phelps.....	Asst. Supt.....	B
Central N. England & Western.....	S. B. Opdyke, Jr.....	Gen. Supt.....	1890
Central N. England & Western.....	Geo. N. Merrill.....	Res. Eng.....	1890
Central Pacific.....	J. H. White.....	Supt.....	B
Central Vermont.....	J. W. Hobart.....	Gen. Man.....	B
Central Vermont.....	C. A. Converse.....	Asst. Supt.....	B
Central of New Jersey.....	J. H. Olhanson.....	Gen. Supt.....	—
Charleston, Cin. & Chicago.....	John F. Jones.....	Supt. & Tr. Man.....	—
Charleston & Savannah.....	C. S. Gadsden.....	Gen. Supt.....	1891
Chattoroi Ry.....	F. H. Oliphant.....	Gen. Man.....	B
Chesapeake & Ohio.....	J. T. Harahan.....	Gen. Man.....	1891
Chesapeake & Ohio.....	H. D. Whitcomb.....	Con. Eng.....	1890
Chesapeake & Ohio.....	T. C. Eggleston.....	Eng. M. W.....	1891
Chesapeake, Ohio & S. W.....	J. L. Frazier.....	Supt.....	B
Chicago, Burlington & Northern.....	Geo. B. Harris.....	Gen. Man.....	A
Chicago, Burlington & Quincy.....	J. Potter.....	V. Pres.....	C
Chicago, Burlington & Quincy.....	F. Lawler.....	Div. Eng.....	1891
Chicago, Fair. & Eau Claire.....	G. A. Foster.....	Asst. Gen. Man.....	B
Chicago & East Illinois.....	O. S. Lyford.....	V. P. & Gen. Man.....	1892
Chicago & N. Michigan.....	J. H. V. Agnew.....	Gen. Supt.....	1892
Chicago & N. Western.....	C. Palmer.....	Supt. Bridges.....	1891
Chicago, Santa Fé & Cal.....	E. G. Nourse.....	Asst. Eng.....	1892
Chicago, M. & St. Paul.....	A. I. Earling.....	Gen. Supt.....	1891
Chicago, M. & St. Paul.....	L. B. Rock.....	Supt.....	B
Chicago, M. & St. Paul.....	Onward Bates.....	Supt. Bridges.....	1891
Chicago, M. & St. Paul, W. Div.....	J. H. Lakey.....	Supt.....	B
Chicago & Atlantic.....	J. H. Parsons.....	Supt.....	A
Chicago & Atlantic.....	Fred. Broughton.....	Gen. Man.....	A
Chicago & Grand Trunk.....	A. B. Atwater.....	Supt.....	1891
Chicago & Grand Trunk.....	W. H. Pettibone.....	Supt.....	B
Chicago & N. Western.....	J. I. M. W. Whitman.....	Gen. Man., at 6 months' notice.....	
Chicago, Rock Island & Pacific.....	W. I. Allen.....	Gen. Supt.....	1892
Chicago, Rock Island & Pacific.....	H. F. Royce.....	Gen. Supt.....	A
Chicago, Rock Island & Pacific.....	A. Kimball.....	V. Pres.....	B
Chicago, Rock Island & Pacific.....	R. H. Chamberlin.....	Supt.....	B
Chicago, St. Paul & Kansas.....	John M. Eagan.....	Gen. Man.....	1891
Chicago & West Indiana.....	B. Thomas.....	V. P. & Gen. Man.....	1890
Chippewa Val. Ch. & W. Mich.....	A. M. Nichols.....	Gen. Supt.....	B
Cincinnati, Ham. & Dayton.....	C. C. Waite.....	V. Pres.....	B
Cincinnati, Jackson & Wash.....	R. W. Buckmaster.....	Sup. Trans.....	A
Cincinnati & Musk. Valley.....	F. G. Darlington.....	Supt.....	1890
Cincinnati & Musk. Valley.....	W. C. Cushing.....	Eng. M. W.....	1890
Cincinnati, N. O. & Texas.....	W. C. Jewett.....	Res. Eng.....	1892
Cincinnati, N. O. & Texas.....	R. Carroll.....	Gen. Supt.....	B
Cincinnati, N. O. & Texas.....	G. B. Nicholson.....	Ch. Eng.....	1891
Cincinnati, N. O. & Texas.....	Ward Baldwin.....	Asst. Eng.....	1891
Cincinnati Union Depot.....	R. L. Read.....	Eng.....	—
Cincinnati, Van W. & Mich.....	E. Garrison.....	Gen. Man.....	B
Cincinnati, Washington & Balt.....	J. H. Stewart.....	Gen. Man.....	A
Cleveland, Ak. & Columbus.....	N. Monsarratt.....	Pres. & Gen. Man.....	A
Cleveland, Cin. Ch. & St. L.....	E. A. Hermann.....	Asst. Eng.....	—
Cleveland & Canton.....	J. W. Wardwell.....	Supt.....	1891
Cleveland & Canton.....	H. A. Kennedy.....	Asst. Supt.....	1890
Cleveland, Col. Cin. & Ind.....	J. D. Layng.....	Pres.....	A
Cleveland, Col. Cin. & Ind.....	G. M. Mead.....	Gen. Man.....	A
Cleveland, Lorain & Wheeling.....	W. B. Hauten.....	Eng.....	1891
Colorado Midland.....	H. Collbran.....	Asst. Gen. Man.....	1891



Columbus, Shawnee & Hocking	F. I. Picard	V. P. & Gen. Man.	1891
Columbus, Hocking Val. & T.	G. R. Carr	Gen. Supt.	B
Columbus & Western	E. A. Flewellan	Gen. Man.	B
Conotton Valley	Samuel Briggs	Gen. Man.	B
Coudersport & Port Allegh.	B. A. McClure	Gen. Supt.	B
Concord & Montreal	H. E. Chamberlin	Gen. Traf. Man.	1891
Dayton, Ft. Wayne & Chicago	I. E. Gimperling	Gen. Man.	1891
Delaware & Hudson	H. G. Young	Gen. Man.	A
Delaware & Hudson	C. D. Hammond	Supt.	1891
Delaware & Hudson	J. W. Burdick	Gen. Pas. Agt.	A
Delaware & Hudson	A. J. Swift	Chief Eng.	1890
Delaware, Lack. & Western	Chas. C. Rose	Div. Eng.	1890
Delaware, Lack. & Western	W. B. Phelps	Supt.	B
Des Moines, N. W.	W. Oglvie	Supt.	1892
Denver & Rio Grande	S. T. Smith	Gen. Man.	1890
Denver & Rio Grande	C. Lydon	Supt.	B
Denver & Rio Grande	R. E. Briggs	Ch. Eng.	1890
Denver, Utah & Pacific	L. M. Fouts	Supt.	A
Denver, Texas & Fort Worth	F. E. Bissell	Supt. & C. E.	1890
Detroit, Mack. & Marquette	D. McCool	Gen. Supt.	B
Detroit, Lansing & Northern	F. M. Drake	Asst. Supt.	1892
Detroit, Lansing & Northern	Job Tuthill	Ch. Asst. Eng.	1892
Detroit, Lansing & Northern	J. J. McLean	Chief Eng.	1892
Duluth & Iron Range	M. I. Carpenter	V. Pres.	1892
Dunkirk, All. Val. & Pittsburgh	Chas. A. Chute	Asst. Supt.	1891
Dunkirk, All. Val. & Pittsburgh	D. Thayer	Gen. Supt.	A
East Tenn., Virginia & Georgia	C. H. Hudson	Gen. Man.	A
East Tenn., Virginia & Georgia	J. W. Fry	Supt.	B
East Tenn., Virginia & Georgia	H. Fink	V. Pres. & G. Man.	B
East & West of Alabama	John Postell	Gen. Man.	B
Eureka & Palisade	B. Gilman	Gen. Supt.	B
Eureka Springs	Powell Clayton	V. Pres. & G. Man.	B
Evansville & Terre Haute	T. A. Allen	Ch. Eng.	1891
Fairhaven Southern	J. J. Donovan	Ch. Eng.	1891
Fall Brook Coal Co.	G. R. Brown	Gen. Supt.	1892
Fall Brook Coal Co.	W. A. Foster	Supt.	1890
Fitchburg	H. A. Phillips	Supt.	1890
Flint & Pere Marquette	Sanford Keeler	Supt.	1891
Flint & Pere Marquette	D. Edwards	Asst. Gen. Man.	B
Flint & Pere Marquette	W. F. Potter	Supt.	B
Flint & Pere Marquette	Geo. M. Brown	R. Master.	B
Florida Ry. & N. Co.	J. J. Phillips	Asst. Gen. Man.	A
Fort Wayne, Cincin. & L.	H. W. Worthington	Gen. Supt.	A
Fort Worth & Denver City	C. L. Frost	Supt.	B
Fort Madison & N. Western	Chas. A. Gilchrist	Rec. & Supt.	1891
Georgia	J. W. Green	Gen. Man.	1891
Georgia	S. A. Hamphill	Supt.	A
Georgia Midland & Gulf	G. Gunby Jordan	Gen. Man.	1891
Georgia Pacific	T. G. Sage	Gen. Man.	A
Georgia Pacific	J. W. Sage	Gen. Supt.	B
Georgia Southern & Florida	J. Lane	Gen. Man.	1891
Grand Trunk of Canada	J. L. Seargeant	Gen. Man.	—
Grand Trunk of Canada	Sir Joseph Hickson	Ex. Gen. Man.	—
Grand Trunk of Canada	Wm. Wainwright	Asst. Man.	B
Grand Trunk of Canada	J. Stephenson	Supt.	B
Grand Trunk of Canada	Samuel Barker	Man. N. Div.	B
Grand Trunk of Canada	Charles Stiff	Supt.	A
Galveston, Sabine & St. L.	B. Barnes	V. Pres. & G. Man.	B
Galveston, Harr. & San Antonio	W. G. Van Vleck	Supt.	B
Grand Southern	F. W. Holt	Supt. & Eng.	B
Green Bay, Winona & St. Paul	Timothy Case	Gen. Supt.	B

Gulf, W. Texas & Pacific.....	M. D. Monserate.....	Pres.....	B
Gulf, Colorado & Santa Fé.....	J. H. Scott.....	Gen. Supt.....	1890
Hartford & Connecticut Western.....	R. P. Martin.....	Supt.....	1890
Hartford & Connecticut Western.....	John F. Jones.....	Gen. Supt.....	B
Houston & Texas Central.....	G. A. Quinlan.....	Gen. Supt.....	1890
Houston & Texas Central.....	J. Waldo.....	V. Pres.....	B
Houston & Texas Central.....	Donald Allen.....	Eng. & Supt.....	B
Houston, E. & W. Texas.....	W. H. Wentworth.....	Asst. Gen. Man.....	B
Houston, E. & W. Texas.....	M. G. Howe.....	Receiver.....	1890
Illinois Central.....	E. T. Jeffrey.....	Gen. Supt.....	B
Illinois Central.....	C. M. Shaeffer.....	Supt.....	B
Indiana, Ill. & Iowa.....	T. P. Shouts.....	Gen. Supt.....	B
Indianapolis, Decatur & Western.....	L. A. Boyd.....	Supt.....	1890
Indianapolis, Decatur & Sp'gfield.....	G. W. Bender.....	Supt.....	A
Indianapolis & St. Louis.....	T. W. Burrows.....	Supt.....	A
International.....	D. E. McFee.....	Supt.....	B
Jacksonville, Tampa & K. W.....	C. O. Parker.....	Asst. Gen. Man.....	1890
Jacksonville S. Eastern.....	E. S. Greenleaf.....	Supt.....	B
Jeffersonville, M. & Indianapolis.....	E. W. McKenna.....	Supt.....	B
Kanawha & Ohio.....	L. D. Button.....	Supt.....	1892
Kanawha & Ohio.....	Thos. R. Sharp.....	Gen. Man.....	A
Kansas City B. M.....	W. B. Knight.....	Ch. Eng.....	—
Kansas City, F. Scott & Memphis.....	Geo. H. Nettleton.....	Pres. & Gen. Man.....	A
Kansas City, F. Scott & Memphis.....	W. W. Fagan.....	Gen. Supt.....	—
Kansas City, C. S. & C. River.....	W. W. Fagan.....	Gen. Supt.....	—
Kansas City, St. Joseph & C. B.....	J. F. Barnard.....	Gen. Man.....	B
Kansas City, Wyandotte & N. W.....	Newman Erl.....	V.-P. & Gen. Man.....	1890
Lackawanna & Pittsburgh.....	W. H. Badger.....	Gen. Supt.....	A
Lake Erie, Alliance & Southern.....	E. E. Scranton.....	Supt.....	1891
Lake Erie & Western.....	Geo. L. Bradbury.....	Gen. Man.....	1891
Lake Shore & Mich. Southern.....	J. E. Childs.....	Asst. Gen. Man.....	1892
Lake Shore & Mich. Southern.....	M. E. Wattles.....	Supt.....	B
Lehigh Valley.....	H. Stanley Goodwin.....	Gen. Supt.....	—
Lehigh Valley.....	Robert H. Sayre.....	Supt. & Eng.....	C
Little Rock & Fort Smith.....	Henry Wood.....	Gen. Supt.....	A
Louisville & Nashville.....	M. H. Smith.....	V.-Pres.....	1891
Louisville & Nashville.....	Chas. O. Parker.....	Supt.....	B
Louisville & Nashville.....	C. D. Purdon.....	Div. Eng.....	—
Louisville & Nashville.....	G. K. McCormick.....	Res Eng.....	1890
Louisville, N. Albany & Chicago.....	John B. Carson.....	V.-Pres. & Gen. Man.....	—
Louisville, E. Albany & Chicago.....	Thos. D. Dunn.....	Gen. Supt.....	B
Louisville, N. Albany & Chicago.....	Jas. Baker.....	Gen. Pass. Agt.....	1890
Louisville, N. Albany & Texas.....	J. M. Edwards.....	V.-Pres. & Gen. Man.....	—
Louisville, Evansville & St. Louis.....	C. A. Darlton.....	Supt.....	B
Los Angeles, Pasa & Glendale.....	John Cross.....	Pres.....	1890
Los Angeles, Pasa & Glendale.....	W. F. McClure.....	Ch. Eng.....	1890
Mahony & Susq. Div. P. & R.....	J. H. Olhausen.....	Supt.....	B
Maryland Central.....	Samuel Rea.....	V.-Pres.....	1892
Manitou & Pike's Peak.....	A. T. Tomlinson.....	Div. Eng.....	1890
Manitoba & N. Western.....	W. C. Baker.....	Gen. Supt.....	1890
Manitoba & N. Western.....	Geo. H. Webster.....	Ch. Eng.....	1890
Memphis & Little Rock.....	Rudolph Fink.....	Rec. & Gen. Man.....	B
Metropolitan of Portland, Or.....	Alfred F. Sears.....	Supt.....	—
Mexican International.....	L. M. Johnson.....	Gen. Man.....	—
Mexican National.....	C. A. Merrian.....	Supt.....	B
Michigan Central.....	B. Douglas.....	Bridge Eng.....	1890
Minneapolis, Lynd. & Min.....	Geo. H. Cooley.....	Ch. Eng.....	1890
Minneapolis, St. P. & S. S. Marie.....	T. D. Underwood.....	Gen. Man.....	1891
Minneapolis, St. P. & S. S. Marie.....	W. W. Rich.....	Ch. Eng.....	1890
Minnesota & N. Western.....	E. G. Russell.....	Asst. Gen. Supt.....	A
Missouri Pacific.....	W. H. Boyd.....	M. of Trans.....	B

Mobile & Ohio.....	T. M. R. Talcott ...	V.-Pres. & Gen. Man.	A
Montana Central .....	H. C. Ives .....	Gen. Man.	1890
Montana Central .....	N. C. Ray .....	Res. Eng.	1891
Monterey & Mex. Gulf.....	J. A. Robertson ...	Gen. Man.	1890
Monterey & Mex. Gulf.....	W. H. Wentworth...	Ch. Eng.	1890
Milford F., & Prov. & Hop.....	E. T. Logee .....	Gen. Supt.	B
Milwaukee, L. Shore & Western..	H. F. Whitecomb. .	Gen. Man.	B
Milwaukee, L. Shore & Western..	H. G. H. Reed .....	Gen. Supt.	B
Milwaukee & Northern.....	C. F. Dutton .....	Gen. Supt.	B
Milwaukee & St. Paul.....	T. D. Underwood ..	Supt.	B
Morgan's St. Louis & Texas.....	J. Kruttschmidt. .	Eng. & Supt.	B
Nashville, Chattan. & St. L.....	Hunter McDonald..	Asst. Eng.	1891
Nashville & Florence.....	J. T. Craik .....	Ch. Eng. & Supt.	B
Natchez, Jackson & Col .....	E. D. Frost .....	Gen. Supt.	B
Naugatuck .....	George W. Beach....	Supt.	A
Nevada Central. ....	F. W. Dunn .....	Gen. Supt.	B
New Haven & Northampton.....	S. B. Opdyke, jr....	Supt.	B
New Orleans, Natchez & Ft. Scott.	H. D. Jenkins .....	Ch. Eng.	1891
New Orleans & Selma.....	Norman Webb.....	Rec.	B
Newport News & Miss. Valley....	J. L. Frazier .....	Supt.	1891
Newport & Northern.....	H. H. Vreeland .....	Supt.	1891
Newport & Wickford .....	Theo. Warren .....	Supt.	B
New York & Boston R. Trans. ....	W. Rotch .....	Eng.	1891
New York & New England .....	A. A. Jackson .....	Gen. Supt.	—
New York & New England.....	J. W. Perkins .....	Asst. Rec.	B
New York Central & H. River....	J. M. Toucey.....	Gen. Supt.	A
New York, New Haven & Hartford.	C. S. Davidson .....	Supt.	C
New York, New Haven & Hartford.	O. M. Sheppard.....	Gen. Man.	1891
New York, Lake Erie & Western..	E. S. Bowen .....	V.-Pres.	B
New York, Lake Erie & Western..	S. M. Felton, jr....	Asst. Pres.	B
New York, Ont. & Western.....	S. W. Lampher.....	Supt. Tran.	1890
New York, Ont. & Western.....	J. E. Childs.....	Gen. Supt.	B
New York, Prov. & Boston.....	J. W. Miller .....	Gen. Man.	—
New York, Prov. & Boston.....	J. B. Gardiner .....	Supt.	B
New York, Susq. & Western.....	Chas. M. Heald .....	Pres.	1890
New York, Susq. & Western.....	C. D. McKelvey ..	Supt.	B
New York City & Northern.....	G. N. B. Edwards...	Gen. Supt.	A
New York, West Sh. & Buffalo....	J. D. Layng .....	Gen. Man.	B
New York & Sea Beach .....	W. O. McDowell....	P.-Pres. & Gen. Man.	B
New York, Pitts. & Chicago .....	G. W. Dixon .....	Supt.	B
New York, Chic. & St. Louis.....	G. H. Kimball.....	Supt.	B
Nicaragua C. C. Co.....	J. F. Le Baron .....	Gen. Supt.	1892
Norfolk & Western.....	Joseph H. Sands....	Gen. Man.	A
Norfolk & Western .....	Charles Blackwell..	Supt. M. P.	B
Norfolk & Western .....	Emile Low .....	Div. Eng.	1890
North Western C. & N.....	E. T. Galt .....	Man.	1890
North Western C. & N.....	J. Bailey .....	Supt.	1890
Northern Pacific .....	T. F. Oakes .....	V.-Pres & Gen. Man.	A
Northern Pacific.....	Robert Harris.....	Pres.	B
Northern Pacific.....	D. R. Taylor .....	Supt.	B
Ohio & Mississippi .....	J. F. Barnard .....	Pres. & Gen. Man.	1890
Ohio & L. R. W.....	B. S. Henning.....	Pres.	C
Ohio Central.....	J. E. Martin .....	Rec.	B
Old Colony.....	J. R. Kendrick .....	Gen. Man.	1891
Ohio River.....	Chas. P. Hatch.....	Ex-Gen. Traf. Man.	1891
Ohio Southern .....	W. H. Van Tasell....	Supt.	1891
Oregon & Washington T.....	F. Riddle .....	Ch. Eng.	1891
Oregon Ry. & Nav.....	H. S. Rowe .....	Supt.	B
Pennsylvania.....	S. M. Prevost.....	Gen. Supt. Trans.	1890
Pennsylvania.....	L. F. Loree .....	Supt.	1891
Pennsylvania .....	Thos. J. Brereton...	Supt.	1890

Pennsylvania.....	O. G. McClellan.....	Supt.....	B
Pennsylvania.....	R. P. Snowdon.....	Asst. Eng.....	B
Pennsylvania.....	S. S. Blair.....	Supt.....	B
Pennsylvania.....	M. W. Thomason.....	Eng. Main. W.....	B
Pennsylvania.....	Robt. Piteairn.....	Gen. A. & Supt.....	1890
Pensacola & Atlantic.....	W. D. Chipley.....	V.-Pres. & Gen. Supt.....	B
Peoria, Decatur & Evansville.....	G. L. Bradley.....	V.-Pres.....	B
Philadelphia & Reading.....	I. A. Sweigand.....	Gen. Supt.....	—
Philadelphia & Reading.....	M. F. Bonzano.....	Supt.....	1890
Philadelphia & Reading.....	I. A. Higgins.....	Sta. Agent.....	1890
Philadelphia & Reading.....	W. Lorenz.....	Ch. Eng.....	B
Philadelphia, Wil. & Baltimore.....	H. H. Carter.....	Supt.....	1891
Pittsburgh, Cincinnati & St. Louis.....	M. J. Becker.....	Ch. Eng.....	1891
Pontiac, Oxford & Port Austin.....	James Houston.....	Gen. Supt.....	1890
Pittsburgh & Lake Erie.....	E. Holbrook.....	Gen. Supt.....	1890
Pittsburgh, Shenango & Lake Erie.....	I. T. Blair.....	Gen. Man.....	1890
Portland & Ogdensburg.....	I. Hamilton.....	Supt.....	B
Providence & Springfield.....	W. Tinkham.....	Pres.....	B
Providence & Worcester.....	Chas. Howard.....	Supt.....	A
Providence & Worcester.....	W. E. Chamberlain.....	Supt.....	B
Providence, W. & Bristol.....	W. Stone.....	Supt. & Eng.....	B
Pullman Palace Car Company.....	G. F. Brown.....	Gen. Supt.....	B
Prince Edward Island.....	L. B. Archibald.....	Supt.....	C
Quebec & Lake St. John.....	I. J. Scott.....	Man.....	A
Queensboro & Falls of R.....	Chas. Seymour.....	Cons. Eng.....	1891
Qu'Appelle & Long Lake.....	H. S. Holt.....	Eng.....	1892
Richmond & Allegany.....	Decatur Axtell.....	Rec. & Man.....	B
Richmond & Danville.....	Julien A. Hall.....	Asst. Eng.....	1892
Richmond & Danville.....	F. M. Rutherford.....	Asst. Eng.....	1892
Richmond, Fred. & Potomac.....	E. T. D. Myers.....	Pres. & Gen. Supt.....	—
Richmond & Petersburg.....	J. R. Kenly.....	Supt.....	B
Rio Grande Western.....	D. C. Dodge.....	Gen. Man.....	1891
Rock Island & Peoria.....	H. B. Sudlow.....	Supt.....	1890
Rochester & Pittsburgh.....	James T. Gardner.....	Gen. Supt.....	B
Rogersville & Jefferson.....	Chas. M. Lentz.....	Supt.....	B
Rome, W. & Ogdensburg.....	H. M. Britton.....	Gen. Man.....	A
San Antonio & Ar. Pass.....	B. F. House.....	Asst. Eng.....	1891
Savannah, Florida & West.....	H. W. Reed.....	Mast. R. W.....	1891
San Pete Valley.....	S. Bamberger.....	Man. Director.....	B
Seaboard Air Line.....	John C. Winder.....	Gen. Man.....	1891
Seaboard Air Line.....	I. T. Myers.....	Gen. Supt.....	1891
Seattle Lake Shore & East.....	F. W. D. Holbrook.....	Man.....	1892
Shenango & Allegany.....	J. T. Blair.....	Gen. Man.....	B
Shenandoah Valley.....	David W. Flickwir.....	Supt.....	1891
Silverton.....	C. W. Gibbs.....	Ch. Eng.....	1890
Skaneateles.....	J. McNamara.....	Supt.....	A
South Florida.....	B. R. Swoope.....	Supt.....	A
South Carolina.....	John B. Peck.....	Gen. Man.....	B
Southern Pacific.....	J. A. Fillmore.....	Gen. Supt.....	1891
Southern Pacific.....	A. C. Bassett.....	Supt.....	B
Southern Pacific.....	J. Kruttschmidt.....	Supt.....	—
Southern Pacific.....	A. C. Hutchison.....	Gen. Man.....	A
Split Rock Cable.....	W. B. Cogswell.....	Gen. Man.....	1890
Staten Island, R. T.....	Frank S. Gannon.....	Gen. Man.....	1891
St. Joseph & Desloge.....	T. T. Onderdonk.....	Gen. Supt.....	B
St. Johns & Lake Euses.....	W. J. Jarvis.....	Supt.....	B
St. Louis, Alton & T. Haute.....	Geo. W. Parker.....	Gen. Man.....	B
St. Louis & San Francisco.....	H. L. Morrill.....	Gen. Man.....	A
St. Louis, Arkan. & Texas.....	A. H. Swanson.....	Rec.....	1891
St. Louis, Arkan. & Texas.....	H. G. Kelley.....	Res. Eng.....	1890
St. Louis & Cairo.....	C. Hamilton.....	Gen. Supt.....	B



St. Louis, Des Moines & North...	H. H. Wade.....	Supt.....	A
St. Louis, Des Moines & North...	C. F. Meek.....	Supt.....	B
St. Louis, Ft. Scott & Wichita...	J. F. Miller.....	V.-Pres.....	B
St. Louis, Ft. Scott & Wichita...	W. H. Norris.....	Train Mas.....	B
St. Paul, Minn. & Manitoba.....	James J. Hill.....	Pres.....	B
St. Paul, Minn. & Manitoba.....	H. C. Ives.....	Asst. Gen. Man...	B
Stoney Creek.....	G. B. Boggs.....	Supt. & Eng.....	B
Suburban R. Transit.....	J. J. R. Croes.....	Ch. Eng.....	1892
Syracuse, Ont. & N. York.....	Albert Allen.....	Gen. Supt.....	A
Taveres, Orlando & Atlantic.....	T. M. T. McKennan.....	Gen. Man.....	A
Terra Haute & Indianapolis.....	W. R. McKeen.....	Pres.....	1890
Tennessee Coal & Iron.....	A. M. Shook.....	Gen. Man.....	B
Texas & Pacific.....	John A. Grant.....	V.-P. & Gen. Man	1892
Toledo & Ohio Central.....	J. M. Ferris.....	Gen. Man.....	1891
Toledo & Ohio Central.....	Clifford Buxton.....	Ch. Eng.....	1891
Tioga.....	R. Du Puy.....	Supt. & Eng.....	B
Toledo, Peoria & Western.....	E. N. Armstrong.....	Gen. Supt.....	1891
Toledo, St. Louis & Kansas.....	A. H. Pettibone.....	Gen. Supt.....	B
Toledo, St. Louis & Kansas.....	S. R. Callaway.....	Ch. Eng.....	1890
Toledo, Ann Arbor & N. M.....	H. W. Ashley.....	Gen. Supt.....	B
Toledo, Col. & Cincinnati.....	Clifford Buxton.....	Ch. Eng.....	1891
Troy & Boston.....	J. Crandell.....	Supt.....	A
Ulster & Delaware.....	J. M. Jones.....	Gen. Supt.....	1891
Union Pacific.....	E. Dickinson.....	Gen. Man.....	1891
Union Pacific.....	S. T. Smith.....	Gen. Supt.....	B
Union Pacific.....	T. Appleton.....	Res. Eng.....	1891
Valley.....	W. Thornburgh.....	Gen. Man.....	1891
Virginia & Truckee.....	H. M. Yerrington.....	V.-Pres. & Gen. Man	B
Wabash.....	K. H. Wade.....	Gen. Supt.....	A
Wagner Sleeping Car Co.....	C. D. Flaggs.....	Gen. Supt.....	—
Western Maryland.....	J. M. Hood.....	Pres. & Gen. Man...	B
Western Maryland.....	B. H. Griswold.....	Gen. F. Agent...	1891
Western N. York & Pennsylvania.....	R. Bell.....	Gen. Supt.....	1890
Wisconsin Central.....	S. R. Ainslie.....	Gen. Man.....	1890
West Shore.....	C. H. Bradley.....	Gen. Supt.....	A
Warren & Farnsworth.....	A. C. Wood.....	Gen. Man.....	B
West Virginia Central.....	C. L. Bretz.....	Gen. Man.....	1892
Wichita & Western.....	D. H. Rhodes.....	Supt. & C. E.....	1891
West Virginia, C. & Pittsburgh.....	W. E. Porter.....	Gen. Supt.....	B
Worcester, Nashua & Roch.....	C. S. Turner.....	Pres. & Gen. Man...	B
Williamsport & N. Branch.....	Ben. G. Welsh.....	Pres. & Gen. Man...	B
York and Peachbottom.....	S. M. Manifold.....	Supt. & Eng.....	B

## APPENDIX No. 3.

The following memorandum, prepared by Sandford Fleming, Chairman of the Special Committee on Uniform Standard Time, has been submitted to the British Government through the Governor-General of Canada, at the instance of the Canadian Institute, Toronto, and referred to a committee of the Department of Science and Art, London, consisting of the following well-known eminent men, viz.:

W. H. M. CHRISTIE.....Astronomer Royal, Greenwich.  
 Professor J. C. ADAMS.....University of Cambridge.  
 Lieut.-General R. STRACHEY.....Royal Engineers, India Office.  
 Dr. HIND.....Superintendent Nautical Almanac.  
 Captain WHARTON.....Hydrographer to the Admiralty.  
 Maj.-Gen'l DONNELLY...Secretary Science and Art Department.



These gentlemen expressed their concurrence in the views advanced in the memorandum, recognizing the advantages which would result from the reform advocated, and the ease with which it may be carried out. On their recommendation the British Government has transmitted the correspondence to the Governments of the several British possessions around the globe "with a view to the adoption of the Hour Zone System in reckoning time generally, and of the 24-hour notation for railway time tables."

The same Committee, in reporting to the British Government, advised that all the railway companies of the United Kingdom be recommended to adopt the 24 hour notation.

---

*MEMORANDUM on the movement for reckoning time on a scientific basis, by which the greatest possible degree of simplicity, accuracy and uniformity will be obtainable in all countries throughout the world.*

---

1. Notwithstanding the great advance which has been made during the present century, in all the arts and sciences and their application to the affairs of human life, the reckoning of time is still in a primitive condition in many countries, and in an imperfect condition in every country. Difficulties have been developed since the introduction of rapid means of communication, through the twin agencies, steam and electricity, which when examined prove that time is computed generally on principles which are untenable. The world's time-reckoning is in fact an exceedingly complicated combination; it is productive of confusion, and the confusion is apt to be increased and intensified as population increases and lines of rapid communication are multiplied.

2. During the last ten years efforts have been made to overcome the evils referred to by establishing a remedial system on a sound scientific basis which would be acceptable to all nations, and by which perfect accuracy, uniformity, and simplicity would everywhere be obtainable.

3. The subject has been carefully considered by many individuals, and by scientific societies in Europe and America. It has been discussed at geographical and geodetic congresses at Venice and Rome, and at Conventions of Scientists and practical business men in America. On all these occasions the solution of the problem has been promoted. As an outcome of these various meetings and efforts, the President of the United States, under the authority of an Act of Congress, invited the governments of all civilized nations to appoint delegates to meet in conference at Washington to consider the whole question and take decisive action in respect thereto.

4. The Washington Conference embraced delegates from twenty-five nations; they had eight sessions; the first was held on 1st October, 1884; the last on 1st November following. After patient deliberation and discussion the object of this International Conference was accomplished by the passage, with substantial unanimity, of a series of resolutions determining the principles upon which all the nations of the world may unite in the adoption of a universal system of reckoning time.

5. The important results of the Conference are the establishment of (1) a prime meridian for reckoning longitude; (2) a zero for time-reckoning, and (3) a unit measure of time to be common to the whole world.

6. The prime-meridian corresponds with the Greenwich meridian.
7. The zero of time may be defined as the moment of mean solar passage on the anti-prime meridian.
8. The unit-measure of time, designated the universal day, may be defined as the interval between two successive mean solar passages on the anti-prime meridian.
9. The Conference further determined that the hours of the universal day shall be counted in a single series from zero to 24.
10. The universal day as defined by the Washington Conference begins and ends at the same moment as the civil day at Greenwich, but it differs from the Greenwich civil day in respect to the numbering of the hours. While the universal day has a single set of hours numbered from 0 to 24, the Greenwich civil day is divided at noon into halves, the half days before and after noon being subdivided into separate sets of hours, each numbered from 0 to 12 and distinguished as anti-meridian and post-meridian. Greenwich time is the local time so-called of the meridian of Greenwich. Universal time, on the other hand, is understood to be common to all localities, and the universal day is held to be the date of the world.
11. Considerable progress has been made in the adoption of the principles of universal time, and the practical success which has attended the application of these principles goes to show that the unification of reckoning by the several civilized nations can best be effected step by step.

#### RECKONING BY HOUR MERIDIANS.

12. The first important step is the adoption of the "HOUR ZONE System," commonly designated in America "STANDARD TIME." It may be stated that in the theory of universal time the fundamental principle is unity; it is held that there is not more than one time in the whole universe, and that the idea of separate and distinct times in each separate locality is incorrect. While the essential principle of Universal time is indisputable, it cannot be denied that a perfectly uniform notation of time throughout the entire globe comes into direct conflict with our preconceived notions and habits of thought. The hour zone system is introduced as an easy means of transition from old to new ideas, and it is found that by adopting hour meridians as local standards for reckoning, grave difficulties are in a large measure overcome without any violent departure from our inherited usages and prevailing customs. The hour zone system also furnishes the means of applying the correct principles of universal time in ordinary affairs.

13. In the hour zone system the circumference of the globe is divided into twenty-four sections or zones. The central line of each zone is an hour meridian, and the hour meridians are fifteen degrees of longitude apart. The accompanying chart of the world on Mercator's projection shows the geographical position of the twenty-four hour meridians. They are numbered in consecutive order towards the west from zero, the ante-prime meridian.

14. The hour zones theoretically extend seven and a half degrees of longitude on each side of the hour meridians, but in practice that is by no means an essential rule. The boundary line of contiguous zones may be governed by national, geographical or commercial circumstances.

15. As the earth rotates on its axis in twenty-four hours, an hour elapses between the solar passage on each successive hour meridian; it is obvious therefore that if the reckoning in each zone be governed by its respective meridian, the reckonings everywhere will be directly related. There will be differences, but the differences will in every case be known and they will invariably be multiples of an hour. Throughout the globe there will be complete identity in the minutes and seconds. For example, when the reckoning in the tenth zone is six hours twenty-five minutes, in the eleventh zone it will be five hours twenty-five minutes, in the twelfth zone four hours twenty-five minutes, and so on, each successive zone differing by an exact hour. Thus the only departure from complete uniformity in reckoning around the globe will be in the numbers of the hours, but the numbers of the hours being governed by the numbers of the hour meridians, the passage to universal time is simple and direct.

16. As the reckoning in the zone of the twelfth hour meridian corresponds with universal time the reckonings in all zones to the east of that meridian will be one or more full hours in advance of universal time, and in all zones to the west of the twelfth hour meridian the reckonings will be behind universal time. Universal time will be the mean of all possible reckonings under the hour zone system, and the universal day the mean of all possible local days.

17. The hour zone system has been adopted for ordinary use in portions of the three continents of Asia, Europe and America. In 1887 an imperial ordinance was promulgated directing that on and after the first day of January in the year following, time throughout the Japanese Empire would be reckoned by the third hour meridian. The reckoning in England and Scotland is by the twelfth hour meridian, in Sweden the eleventh hour meridian is the standard, and quite recently it has been resolved in Austria-Hungary to be governed by the same meridian. Efforts are now being made to follow the same course in Germany and in other European countries. In North America the hour zone system has been in general use for six years, the reckoning of time being governed as follows, namely:

By the 16th-hour meridian in Nova Scotia and Prince Edward Island.

By the 17th-hour meridian in New Brunswick, Quebec, Ontario, Maine, Vermont, Massachusetts, New Hampshire, Connecticut, New York, Pennsylvania, Rhode Island, New Jersey, Maryland, Virginia, North and South Carolina, Georgia, Florida.

By the 18th-hour meridian in Manitoba, Keewatin, Minnesota, Wisconsin, Michigan, Iowa, Ohio, Illinois, Indiana, Kentucky, Missouri, Arkansas, Tennessee, Alabama, Mississippi, Louisiana.

By the 19th-hour meridian in Assiniboia, Saskatchewan, Alberta, Athabasca, Montana, Dakota, Wyoming, Nebraska, Colorado, Kansas, New Mexico, Texas, Utah, Arizona.

By the 20th-hour meridian in British Columbia, Washington, Idaho, Oregon, Nevada, California.

18. The adoption of the hour zone system has been the means of removing the chaos of local times which in many quarters previously caused much friction. Wherever the reckoning is governed by the same standard meridian there is complete uniformity in every division of time. In Japan, Central Europe, Great Britain, United States, Canada and

Mexico identity of reckoning prevails. In all these countries the hours are struck at the same moment, the only difference is in the numbers by which they are locally known; with that single exception, every division of the day is simultaneous.

#### THE 24-HOUR NOTATION.

19. The second important step in regulating the reckoning of time throughout the world is to abandon the division of the day into ante-meridian and post-meridian hours, separately numbered, and to substitute a single series of hours numbered from 0 to 24. This change was resolved upon by the Washington Conference with respect to the universal day.

20. The old practice of dividing the day into separate sets of twelve hours, however it arose, has not only no advantage to recommend it, but the usage has been found to have positive disadvantages, which have been brought into prominence within the past generation. The division of the day into halves doubles the chance of error, and tends to confusion in connection with the running of railway trains. The misprint or mistake of a single letter, A.M. for P.M., or *vice versa*, will easily arise to cause inconvenience, loss of time, possibly loss of property or loss of life.

21. The 24-hour notation, so-called, removes all doubt and uncertainty and promotes safety. Where it has been adopted in Canada there is no ambiguity; moreover the change has been effected without difficulty and without danger. The hours having a lower number than twelve are known to belong absolutely to the first part of the day, and those having a higher number to the afternoon and evening.

22. The 24-hour notation is strongly recommended by prominent men in Russia, Germany, Italy, Austria, Belgium, France, Spain, Great Britain—indeed it may be said in every country in Europe. It is brought into daily use on the great lines of telegraph leading from England to Egypt, India, China, Australia and South Africa. It is received with very great favor in America. It has been in use for nearly four years on 2 354 miles of the Canadian Pacific Railway, and for nearly three years on the Canadian Government Railway, the Intercolonial, 986 miles in length. The managers of these railways and all the employés speak of the 24-hour notation in the highest terms. It is the only system in use, at this date, north of the 49th parallel and west of the 89th meridian. There is not a province in Canada where it is not already in use. It has been adopted on the railways in Nova Scotia, New Brunswick, Prince Edward Island, Manitoba, Assiniboia, Alberta, British Columbia and partly in Quebec and Ontario; so satisfactory are the results of the new notation that it has been determined to extend its application, and it is expected that before long it will be in general use for railway purposes throughout the Dominion.

23. In the United States a strong expression of opinion in favor of the 24-hour notation has been obtained. The American Society of Civil Engineers, deeply concerned in the perfection of the railway system of the republic, has, since the year 1880, taken an active interest in time reform. This Society led the way in preparing the minds of men for the general acceptance of the hour zone system six years ago, and since then it has vigorously directed attention to the 24-hour notation. It has a special committee whose duty under the authority of the Society is to correspond with railway managers on the subject, and in every



proper way to promote the adoption of the new notation. The communications which have been sent out by the American Society of Civil Engineers to the leading railway men throughout the country have elicited a very large number of replies. They embrace the opinion of, it is believed, a considerable majority of the managers of all the railway companies in North America; and of all who have been heard from about 97 per cent. are in favor of the adoption of the 24-hour notation in the railway service of the country at an early date. It is quite obvious that there is a widespread feeling in favor of the change, and it only remains for the General Time Convention, an organized body, representing all the railways in the United States, to take decisive action in the matter, so that the new notation may be brought into use simultaneously in every section of the country.

24. Canada, in adopting the hour zone system, and in introducing the 24-hour notation, has undoubtedly taken the lead in carrying into effect, in the most practical manner possible, the essential principles of universal time. The 24-hour notation has likewise been introduced in the railway service of China, and it is not a little remarkable that one of the oldest Eastern civilizations, conjointly with the youngest Western civilization, should set an example in breaking through the trammels of custom to inaugurate a reform which every intelligent person believes to be desirable. Universal time will be substantially adopted in North America so soon as the 24-hour notation is brought into use throughout the United States. There is but one step necessary to secure to Great Britain all the advantages of universal time—that is the adoption of the 24-hour notation; this one reform concerns the railway system and railway travelers especially, and in a country where all travel more or less, I cannot but think that if English railway managers were informed as to the ease with which the change has been introduced in Canada and the satisfactory results which have followed, they would very speedily take means to obtain similar advantages. I am confirmed in this view by an examination of the letters which have been received by the Science and Art Department, South Kensington, copies of which I have been favored with. These letters go to show that the resolutions of the Washington Conference on this subject are cordially favored by the following important bodies and departments, viz.:

1. Royal Astronomical Society.
2. The Royal Society.
3. The Board of Trade.
4. The General Post Office.
5. The Eastern Telegraph Company.
6. The Eastern Extension Telegraph Company.
7. The Eastern and South African Telegraph Company.
8. The Society of Telegraph Engineers.
9. The Trinity House.
10. The India Office.
11. The Colonial Office.
12. The Admiralty.

To these may be added the Committee of Council on Education and the Board of Visitors of the Royal Observatory, Greenwich. Indeed, I cannot learn that a single objection has been received from any quarter.

25. As the fundamental objects of the Washington Conference were to remove all doubt and ambiguity in time-reckoning, to prevent discrepancies, to secure simplicity and introduce uniformity, it is mani-



festly important that the changes proposed, supported as they were at the Conference by the representatives of twenty-five nations, and subsequently looked upon in so many quarters as in themselves intrinsically desirable, should without unnecessary delay be accepted, and as far as practicable put in force generally. The first important step is the selection of hour meridians and the adoption of the hour zone system. With these objects in view the accompanying map has been prepared; it shows the position of the 24-hour meridians and indicates in a general way the country or section of country to which any particular hour meridian has greatest proximity. It would greatly advance the unification of time throughout the world, and greatly promote the common good of mankind, if every nation, with all convenient speed, would take means to select the hour meridians on which its reckoning of time may be based. Appended hereto will be found a table indicating the hour meridians which in each case may be found eligible for selection, but in a matter of this kind each nation must judge for itself. (See Table No. 1.)

26. I have mentioned what has been done in America, more especially in Canada, in furtherance of this movement. If means be taken to extend the use of the hour zone system to all the British possessions around the globe they will individually and collectively participate in the advantages of a common reckoning of time. I venture to submit, suggestively, the appended list of the principal British colonies and dependencies with the hour meridians which appear the most suitable for standards in each case. (See Table No. 2.)

SANDFORD FLEMING.

OTTAWA, 20th November, 1889.

## NOTE.

## RESPECTING THE HOUR MERIDIANS AS NUMBERED ON THE MAP.

It is obviously desirable that the hour meridians or sub-standards, for reckoning time by all nations, should be designated in a manner which will render them easily distinguished and readily known throughout the world. A nomenclature based on geographical terms or derived from local names may appear appropriate in one country, while in another, or in an opposite hemisphere, it might be quite inapplicable. Moreover, not only would differences of opinion arise as to the appropriateness of such terms, but owing to the diversity of languages among the nations, the difficulty of selecting names universally acceptable would be so increased as to render a common agreement respecting them scarcely attainable.

These objections do not apply to numbers. A nomenclature based on numbers would be common to all nations, and each term would have the same precise meaning in all languages and in both hemispheres. The numbers given to the hour meridians, as shown on the map, begin at zero and follow the sun in its apparent motion. The solar passage on the anti-prime meridian being the zero of the "universal" or "world" day, at the end of the first hour the solar passage would be on the first hour meridian, at the end of the second hour it would be on the second hour meridian, and so on for each of the twenty-four hours—the hour in each case agreeing with the number of the hour meridian at the instant of mean solar passage. Thus it will be evident that with the hour meridians so numbered the solar passage would be the perpetual index of "world" time. Local "Standard Time" as reckoned in any hour zone would be *faster* or *slower* than "world" time according to the following formula: Let  $h$  be the number of the hour meridian, then *East* of the prime meridian, S. T. hours  $fast = 12 - h$  *West* of the prime meridian, S. T. hours  $slow = h - 12$ .

The principle of this simple means of distinguishing the twenty-four meridians constituting the sub-standards for reckoning time the world over, and the advantages to accrue from its universal application, are further explained in the Smithsonian Report for 1886, pages 351-2.

S. F.

January 21st, 1891.

TABLE No. 1.

## FOREIGN COUNTRIES.

Table showing the hour meridians numbered as on the accompanying map and conveniently situated for reckoning time under the hour zone system.

The last column gives the differences between local reckonings and the time of the world—universal time.

The sign PLUS indicates that local reckonings are in advance of, and MINUS that they are behind, world time in each case.

COUNTRIES.	HOUR MERIDIANS.		Hour Zone Reckonings faster or slower than World Time.
	East or West of Greenwich.	Numbered on New Map.	
Argentine Republic.....	60 West	16	— 4 Hours.
Austria-Hungary.....	15 East	11	+ 1 "
Belgium.....	0 —	12	— 0 "
Bolivia.....	60 West	16	— 4 "
Brazil.....	45 "	15	— 3 "
".....	60 "	16	— 4 "
Bulgaria.....	30 East	10	+ 2 "
Costa Rica.....	90 West	18	— 6 "
Chili.....	75 "	17	— 5 "
China.....	120 East	4	+ 8 "
".....	105 "	5	+ 7 "
Colombia.....	75 West	17	— 5 "
Congo.....	15 East	11	+ 1 "
Denmark.....	15 "	11	+ 1 "
St. Domingo.....	75 West	17	— 5 "
Egypt.....	30 East	10	+ 2 "
France.....	0 —	12	— 0 "
Germany.....	15 East	11	+ 1 "
Greece.....	30 "	10	+ 2 "
Hawaii.....	150 West	22	— 10 "
Honduras.....	90 "	18	— 6 "
Haiti.....	75 "	17	— 5 "
Heligoland.....	15 East	11	+ 1 "
Italy.....	15 East	11	+ 1 "
Japan.....	135 "	3	+ 9 "
Mexico.....	105 West	19	— 7 "
Netherlands.....	0 —	12	— 0 "
Nicaragua.....	90 West	18	— 6 "
Norway.....	15 East	11	+ 1 "
Paraguay.....	60 West	16	— 4 "
Persia.....	60 East	8	+ 4 "
Peru.....	75 West	17	— 5 "
Roumania.....	30 East	10	+ 2 "
Siam.....	105 "	5	+ 7 "
Servia.....	30 "	10	+ 2 "
Spain.....	0 —	12	— 0 "
Sweden.....	15 East	11	+ 1 "
Switzerland.....	15 "	11	+ 1 "
Turkey.....	30 "	10	+ 2 "
Russia in Europe.....	45 "	9	+ 3 "
".....	30 "	10	+ 2 "
Russia in Asia.....	165 "	1	+ 11 "
".....	150 "	2	+ 10 "
".....	135 "	3	+ 9 "
".....	120 "	4	+ 8 "
".....	105 "	5	+ 7 "
".....	90 "	6	+ 6 "
".....	75 "	7	+ 5 "
".....	60 "	8	+ 4 "
Uruguay.....	60 West	16	— 4 "
United States.....	75 "	17	— 5 "
".....	90 "	18	— 6 "
".....	105 "	19	— 7 "
".....	120 "	20	— 8 "
Alaska.....	135 "	21	— 9 "
".....	150 "	22	— 10 "
Venezuela.....	60 "	16	— 4 "

TABLE No. 2.

## BRITISH POSSESSIONS.

Table indicating the hour meridians, numbered as on the accompanying map, which may be selected as local standards for reckoning time in each of the several British possessions.

The last column gives the differences between local reckonings and the time of the world—universal time. The sign PLUS indicates that local reckonings are in advance of, and MINUS that they are behind, world time in each case.

COUNTRIES.	HOUR MERIDIANS.		Hour Zone Reckonings faster or slower than World Time.
	East or West of Greenwich.	Numbered on Map.	
The British Islands (comprising)—			
England and Wales.....	0	12	0 Hours.
Scotland.....	0	12	0 "
Ireland.....	0	12	0 "
Canada (comprising)—			
Nova Scotia.....	60 West	16	-- 4 "
New Brunswick.....	75 "	17	-- 5 "
Prince Edward Island.....	60 "	16	-- 4 "
Quebec.....	75 "	17	-- 5 "
Ontario.....	75 "	17	-- 5 "
Manitoba.....	90 "	18	-- 6 "
Assiniboia.....	105 "	19	-- 7 "
Saskatchewan.....	105 "	19	-- 7 "
Alberta.....	120 "	20	-- 8 "
Athabasca.....	120 "	20	-- 8 "
British Columbia.....	120 "	20	-- 8 "
Australasia (comprising)—			
New South Wales.....	150 East	2	+ 10 "
Victoria.....	150 "	2	+ 10 "
Queensland.....	150 "	2	+ 10 "
Tasmania.....	150 "	2	+ 10 "
South Australia.....	135 "	3	+ 9 "
Western Australia.....	120 "	4	+ 8 "
New Zealand.....	165 "	1	+ 11 "
Fiji.....	165 "	1	+ 11 "
New Guinea.....	150 "	2	+ 10 "
Possessions in Asia (comprising)—			
India.....	75 "	7	+ 5 "
Burmah.....	90 "	6	+ 6 "
Ceylon.....	75 "	7	+ 5 "
Hong Kong.....	120 "	4	+ 8 "
Straits Settlements.....	105 "	5	+ 7 "
Labuan.....	120 "	4	+ 8 "
West India (comprising)—			
Jamaica.....	75 West	17	-- 5 "
Turk's Island.....	75 "	17	-- 5 "
British Guiana.....	60 "	16	-- 4 "
Bahamas.....	75 "	17	-- 5 "
Trinidad.....	60 "	16	-- 4 "
Barbadoes.....	60 "	16	-- 4 "
Grenada.....	60 "	16	-- 4 "
British Honduras.....	90 "	18	-- 6 "
St. Vincent.....	60 "	16	-- 4 "
St. Lucia.....	60 "	16	-- 4 "
Tobago.....	60 "	16	-- 4 "
Antigua.....	60 "	16	-- 4 "
Montserrat.....	60 "	16	-- 4 "
St. Christopher.....	60 "	16	-- 4 "
Virgin Islands.....	60 "	16	-- 4 "
Dominica.....	60 "	16	-- 4 "

TABLE No. 2—*Continued.*

COUNTRIES.	HOUR MERIDIANS.		Hour Zone Reckonings faster or slower than World Time.	
	East or West of Greenwich.	Numbered on Map.		
Possessions in Africa (comprising)—				
Cape of Good Hope.....	30 East	10	+	2 “
Bechuanaland.....	30 “	10	+	2 “
Basutoland.....	30 “	10	+	2 “
Natal.....	30 “	10	+	2 “
Sierra Leone.....	15 West	13	—	1 “
Gambia.....	15 “	13	—	1 “
Gold Coast.....	0	12	0	0 “
Lagos.....	0	12	0	0 “
Miscellaneous (comprising)—				
St. Helena.....	0	12	0	0 “
Gibraltar.....	0	12	0	0 “
Malta.....	15 East	11	+	1 “
Cyprus.....	30 “	10	+	2 “
Bermuda.....	60 West	16	—	4 “
Falkland Islands.....	60 “	16	—	4 “
Aden.....	45 “	9	+	3 “
Ascension.....	15 West	13	—	1 “
Fanning Island.....	150 “	22	—	10 “
Mauritius.....	60 East	8	+	4 “
Newfoundland.....	60 West	16	—	4 “

## REPORT OF A MINORITY OF THE COMMITTEE PRESENTED JANUARY 21ST, 1891.

*To the American Society of Civil Engineers:*

The undersigned, a member of the Committee on Uniform Standard Time, dissenting from the report of the Committee, presents this report, referring to the memorial to Congress which the Society adopted March 5th, 1890:

## UNIFORM STANDARD TIME BY ITSELF.

The Society represented to the Government of the United States that it would be in the general interest to legalize by act of Congress the now common system of regulating time by hour standards. The common use of the system justifies the Uniform Standard Time Committee in saying something more to the Society about it without waiting for the legalization sought of Congress. The system consists in having the minutes and seconds of the clock uniform where the system is in use, the differences in standard times consisting of integral hours. Clearly then the simple way to designate standard times is to set forth by how many hours and in which way they differ from the time of the point of reference or initial point of the system. Accordingly the times now in use on the railroads in the United States and Canada might properly be called, in the suggested Act of Congress and elsewhere:

5 hours slow time.  
6 “ “  
7 “ “  
and 8 “ “



It is objectionable to designate them, as is now common, by the long phrases:

	Eastern Standard Time.
	Central “
	Mountain “
and Pacific	“

Among the advantages possessed by the proposed nomenclature and lacking in the current phraseology are:

*First.*—Accuracy and precision of description, making clear the relation of each standard time to all others, which is especially useful at places where railroad trains change their time, and for fixing dates at places antipodal to the initial point of the system.

*Second.*—Universal intelligibility and appropriateness for application to foreign countries, favoring the extension of the system.

In the foregoing discussion time-reckoning has been considered by itself.

#### TIME-RECKONING CONNECTED WITH LONGITUDE AS TO STARTING-POINT, DIRECTION OF COUNTING AND NOMENCLATURE.

It is not sufficient to consider time-reckoning by itself alone. The exact phraseology of the memorial above cited was “Regulating Time by Hour Meridians,” and the word “meridians” draws attention to the close connection between time and longitude, which has of necessity been recognized throughout the Uniform Standard Time Committee’s work, and has appeared in the words of nearly every one of its reports, including accompanying papers. It is an additional advantage of the above proposed nomenclature of standard times that it harmonizes sufficiently well with the established practice of longitudinal notation. The International Meridian Conference at Washington, 1884, recommended that longitude should be counted both ways from the prime meridian, east longitude being plus and west longitude minus. (See Am. Soc. C. E. Proceedings, Vol. II., p. 14, Resolution 3.) This is among the resolutions whose formal acceptance by the Government of the United States was represented to be in the general interest by this Society in its memorial. Upon maps in the English Bradshaw’s Railway Guide and elsewhere the meridians of longitude are numbered in minutes of time “fast” or “slow.”

This report has thus far dealt with the starting-point, the direction of counting and the nomenclature of longitude and associated time-standards.

#### TIME-RECKONING CONNECTED WITH LONGITUDE AS TO THE DIVISIONS.

The connection of time with longitude as to divisions is illustrated by such maps as were just now mentioned, as well as by the plates that the Am. Soc. C. E. has issued, which show the globe with special divi-

sions of its surface marked by meridians to correspond with the divisions of the day. One of those plates may be found in the Transactions, Vol. X, Plate XLVII, and is designated at the end of the Table of Contents as "Plate Illustrating Uniform Standard Time"; another of them was in the Uniform Standard Time Committee's brochure, circulated in 1882. At the International Meridian Conference at Washington in 1884, Mr. Sandford Fleming, delegate of Great Britain, expressed himself thus: "To my mind, longitude and time are so related that they are practically inseparable." (See p. 116 of the Protocols of the Proceedings.) Not to waste words over the evidence of this connection, everybody knows that in their subdivision by sixtieths into minutes and seconds, time and angular measure are like each other and are unlike the rest of our measures.

In discussing the Uniform Standard Time Committee's report at the St. Paul and Minneapolis Convention, July 21st, 1883, Dr. Egleston, member of the Committee, said that it looked as though the Am. Soc. C. E. would have the credit of initiating a movement which would be just as thoroughly historical as the change of time by Ptolemy. (See Proceedings, Vol. IX, p. 111.) This initiating of historical changes requires the Society to turn for a moment to ancient history and to notice one of the important things associated with the name of Ptolemy, to wit: sexagesimal arithmetic. To illustrate it, the quantity which we call  $\pi$  and remember as  $3\frac{1}{7}$  or 3.1416, Ptolemy took to be  $3^{\circ} 8' 30''$ , that is to say  $3 + \frac{8}{60} + \frac{30}{3600}$ , though he used Greek letters and not the characters that we do. To explain the system to modern readers, it is written in this way in the "Encyclopædia Britannica," vol. 20, p. 88, article "Ptolemy," where a very good account is given of Ptolemy's table of chords. The radius, or chord equal to radius, and also the arc subtended by it, were divided into sixty parts, each of those parts into sixty minutes, and each minute into sixty seconds. Among the data which geometry afforded was that the chord of seventy-two such parts of arc is, in parts of radius,  $70^{\circ} 32' 3''$ , that is  $\frac{70}{60} + \frac{32}{3600} + \frac{3}{216000}$ , both the arc and the chord having their lengths expressed by the same sexagesimal notation. We can praise Ptolemy at least for consistency in that.

We do things differently now. In the table of chords at the end of Gillespie's "Land Surveying" the chord of  $71^{\circ} 60'$  is 1.1756, it being stated at the top of the page that the radius is 1.0000; in Chambers's "Mathematical Tables" likewise the chord of  $71^{\circ} 60'$  is 1.1755706 (see p. 281). So in our customary practice we abandon the idea of having both arc and chord divided according to any one system of arithmetical notation; we divide the arc by the ancient sexagesimal method of Ptolemy—but we express the length of the chord according to modern arithmetical practice. The real agreement of our tables with Ptolemy's appears from the fact that

$$1.000 : 1.1755706 = 60^{\circ} : 70^{\circ} 32' 3''.$$

We must not blame Ptolemy for dying 1700 years ago, when our "Arabic" notation had not been introduced. We have to blame ourselves for now keeping up a ridiculous incongruity between our angular and linear reckonings. We have to abandon Ptolemy's notation of arcs as we have abandoned Ptolemy's notation of chords. In the first place, instead of basing our reckoning on one-sixth of the circumference, or the angle of an equilateral triangle, we have to base it on the quadrant, or right angle, which is our angular unit. In the second place, we have to subdivide decimally. This is done, for example, in Sanguet's tables, published in 1889; he has a table of chords in which 1.1756 is found as the chord of eighty grades, or hundredths of the quadrant, instead of 72 sixtieths of the sextant.

This new centesimal angular division has obtained approval in many countries. Several of the replies to the Uniform Standard Time Committee's canvassing circular in 1882 indorsed it; and a number of gentlemen belonging to the Am. Soc. C. E. have expressed themselves decidedly in favor of it. One member has written that he used an instrument with that division almost constantly on surveys for a year, and made trigonometric tables adapted to it, and found it convenient, and preferred it to the ancient division.

The centesimal division was proposed by Lagrange, and introduced in pure mathematics and in the practice of astronomy and geodesy by Delambre and Méchain, who used it on their celebrated meridian survey, Legendre, Lacroix, Carnot, Prony, Monge, Borda, Laplace, Biot, Pissant and others. More recently it has been indorsed among others by Leverrier, the late General Perrier and Messrs. d'Abbadie, de Chancourtois and Hoüel.

The centesimal division has been used from the beginning of this century by the officers in charge of the general triangulation of France under the names, formerly, of *Ingénieurs Militaires-Géographes* and *Dépôt de la Guerre*, and now of *Service Géographique de l'Armée*. On the staff map of France (de l'État-Major, similar to the designation of the Ordnance survey of Great Britain) the centesimal division is engraved along with the old degrees. The same is the case with the maps of the detailed geological survey of France under the Ministry of Public Works. The centesimal division has been introduced into the instruction given at the School of Application of Artillery and Engineering, and has been recently adopted by the Administration of the Cadastre or topographical survey of France. It is said to be in use also by the Belgian military staff. The benefits to be obtained by the change are said to be a saving of time in the proportion of three to two and a diminution of the risk of error in the proportion of four to one in observation as well as in computation. The practice of repeating angles is obviously facilitated.

The introduction of the method of rectangular co-ordinates in sur-

veying is bringing the centesimal division into use in France, and it is already, January 30th, 1891, generally adopted for the graduation of tacheometers.\* It has thus been brought into use in the applications of topography on public works. At the Paris Exposition in 1889 instruments with centesimal graduation were exhibited by the War Department, the Bureau des Longitudes and eleven other exhibitors. The instruments so graduated included tacheometers, theodolites, compasses and protractors. The centesimal division was also adopted for the huge terrestrial globe which attracted great attention. It is freely used in recent technical literature.

Callet's collection of logarithm tables, Paris, 1795 and 1853, containing trigonometric functions for the centesimal division, is well known. Centesimal tables by Hobert and Ideler were published at Berlin, 1799. The tables of Borda and Delambre, Paris, 1800-01, also centesimal, are out of print. The great "Tables du Cadastre" have remained in manuscript in 17 enormous folios for nearly a hundred years. One of the principal difficulties in the way of introducing the centesimal division has been said to be the want of such a variety in logarithmic tables as was afforded with the ancient subdivision. This difficulty is now being rapidly removed. The French Minister of War has directed the Geographical Service of the Army to get out two sets of tables based on the "Tables du Cadastre." One, to five places, with excellent typography and arrangement, was issued from the National Press in 1889; and the other, extending to eight places, was announced for publication in 1890. There was also published by Gauthier-Villars et fils in 1889 a new collection of five-place logarithms with the centesimal subdivision, by J. L. Sanguet, which was mentioned above.

From Proceedings Am. Soc. C. E., Vol. IX, p. 154, it appears that on November 21st, 1883, Dr. J. E. Hilgard, M. Am. Soc. C. E., and at that time and during several years a member of the Uniform Standard Time Committee, stated the results of the Seventh General Conference of the International Geodetic Association, held at Rome in October, 1883, which specially discussed the unification of longitude and time. Both the United States and Great Britain were represented in the Conference. Among its resolutions the following was adopted without an opposing vote: \* \* \* "the Conference recommends on this occasion the extension, in multiplying and perfecting the necessary tables, of the application of the decimal division of the quadrant, at least for the great numerical calculations for which it presents incontestable advantages, even if it be desired to preserve the ancient sexagesimal division for observations, maps, navigation, etc."

---

\* For particulars about the tacheometer and its being manufactured by Troughton & Simms, of London, with centesimal graduation, see Minutes of Proceedings of the Institution of Civil Engineers, Vol. XCI, pp. 288-9 and 307, and Vol. XCIX, pp. 309 and 316, for 1887 to 1890. In connection with the tacheometer the centesimal division appears to have been much used in Italy and to some extent in Spain.



Of late years it has been feasible, as never during many previous centuries, to secure concerted international action, owing, prominently among other things, to our wonderfully increased facilities for inter-communication, which was remarked upon at the inception of the work of the Uniform Standard Time Committee. International concert of action is essential to the progress of the movement for decimalizing angular measure, and is well exemplified in the passage of the resolution just now quoted.

The decimalizing of angular measurement concerns especially engineers, navigators and astronomers, few in number and specially trained, so that the improvement can be urged upon them with hope of speedy beneficial results.

---

In regard to time-reckoning, which concerns everybody, the complete accomplishment of any change can only be brought about by the great labor of instructing a vast number of ignorant and stupid people. In other respects the question is analogous to that of angular measure. Anciently the night was divided into twelve parts, and the daytime was also divided into twelve parts, the two sets of parts having lengths that varied with the season of the year and differed from each other; and even now we have a division of the day into halves, each consisting of twelve parts, and distinguished as A.M. and P.M., with a further subdivision which, though sexagesimal, is not so simply related to the customary angular measure as is desirable. In the first place, as to the basis of the daily reckoning, it is a matter of general agreement that it would be preferable not to have the A.M. and P.M. division, but to have the whole day consist of subdivisions continuously numbered. In the second place, as to subdivision, decimal instead of sexagesimal subdivision would have some advantages and some disadvantages in time-reckoning as in other reckonings.

As to the first point, the continuous counting of the subdivisions of the day, instead of a separation into A.M. and P.M. halves, is already the practice of astronomers; and to promote uniformity the International Meridian Conference at Washington, in 1884, resolved (6th), "That the Conference expresses the hope that, as soon as may be practicable, the astronomical and nautical days will be arranged everywhere to begin at mean midnight." (See Am. Soc. C. E. Proceedings, Vol. XI, p. 14.) This resolution was adopted without division. When this shall have been brought about, there will be even more reason than now for recommending the popular use also of a continuous numeration from midnight to midnight. That in an Act of Congress a permissive clause should be embraced authorizing and legalizing such continuous numeration, was represented to be in the general interest by the Am. Soc. C. E.'s memorial to Congress.

As to the second point, the decimal subdivision of time-reckoning,



the same memorial, adopted by vote of 226 against 7, represented that "it would be in the general interest of the United States to formally accept the resolutions of the International Conference held at Washington in 1884." The only one of those resolutions that especially concerns engineers is (see Proceedings Am. Soc. C. E., Vol. XI, p. 14), "that the Conference expresses the hope that the technical studies designed to regulate and extend the application of the decimal system to the division of angular space and of time shall be resumed, so as to permit the extension of this application to all cases in which it presents real advantages." Twenty-one nations, including Great Britain and the United States, voted in favor of this resolution, none opposed, and three abstained, to-wit: Germany, Guatemala and Sweden.

To study the subject of decimalization is permissible whether Congress formally accepts anything or not; so it is in the power of the Society to attain the object contemplated.

Respectfully submitted,

FRED. BROOKS,

*Member of Committee on Uniform Standard Time.*

JANUARY 21st, 1891.

## REPORT OF COMMITTEE ON IMPURITIES OF DOMESTIC WATER SUPPLIES.

*To the American Society of Civil Engineers:*

This Committee was originally appointed on December 12th, 1889, and at the Annual Meeting of last year presented such short report as could be prepared in the limited time at the Committee's disposal. This report was received by the Society, the Committee continued, and the Board of Direction instructed to issue further instructions to the Committee, enlarging the scope of the investigation.

In compliance therewith, under date of April 12th, 1890, the Board transmitted to the Committee the following:

*To the Committee on securing information as to Impurities in Public Water Supplies:*

GENTLEMEN,—In accordance with the vote of the American Society of Civil Engineers, passed at its Annual Meeting January 15th, 1890, the Board of Direction send you the following additional instructions as to the further action of your Committee.

The Board, fully understanding the value of the report presented by yourselves at the Annual Meeting, believe that the labors of the Committee should now extend in another direction. It is obvious that you could not spare the time to enter into a series of investigations for the solution of this weighty question; but, in the opinion of the Board, the Society desires to ascertain whether the public bodies which, throughout the country, have charge directly or indirectly of the purity of the water supplies, would be disposed to unite their efforts to concentrate,

for the benefit of all, the observations made at various points. It appears to the Board that the best manner to carry out the intentions of the Society is to address to the State Boards of Health, to the superintendents or engineers in charge of water-works, and to such other persons or bodies that the Committee would, in their judgment, select, a circular embodying the questions which, in the opinion of the Committee, would best cover the following grounds:

*First.*—A statement, which cannot be too strong, of the great evils caused in communities by the impurities found in public water supplies, and the benefits which would result from a concerted action in endeavoring to find a remedy.

*Second.*—Whether or not the water supplies under their charge have been contaminated from various causes.

*Third.*—At what time and from what causes, if known?

*Fourth.*—Whether the trouble was continuous or spasmodic?

*Fifth.*—Whether they would be disposed to unite their efforts with those of others to concentrate for the benefit of all the observations made at various points of the country?

*Sixth.*—What remedies, if any, have been applied, with or without success?

It is not the intention of the Board to dictate to the Committee the range of questions to be put to their correspondents, but simply give an outline of its views on the subject. It is obvious that the consideration of all observations which could be obtained, and the investigation which should follow, would require a financial organization, the establishment of which would meet with serious difficulties; but it appears to the Board that it would be premature at the present time to complicate the question by the consideration of those matters which should be kept for some future time, if the number and character of the answers received by the Committee are sufficient to justify further action.

For the Board of Direction,

JOHN BOGART,

*Secretary.*

These instructions reached the Committee at a time of year when all the members were exceedingly busy with their professional engagements; and finally Mr. Ward resigned from the Committee, about July 1st, before any further action had been taken. This left the Committee incomplete, and the work remained in abeyance until after the appointment of Mr. Fteley to the vacancy, on November 6th, 1890.

A committee similar in scope to the one which we represent was appointed by the American Water Works Association at its annual meeting, held in Chicago, in April, 1890, and, learning that this committee was actively at work, we communicated with them and found that they had corresponded with the various water boards throughout the country, covering in a considerable degree the ground included in our second instructions. We also held a conference with them, and concluded, as the result of such conference, that it is not desirable for our Committee to undertake now the collection of information by correspondence. Our reasons for this conclusion are: (1) This particular feature has been well covered by the work of the Water Works Associa-

tion's committee, and we believe it is not necessary for us to go over the same ground. A mere following in their footsteps would likely lead to confusion and negative results only. (2) We are further satisfied that all the information that can be obtained by correspondence is already in the hands of the Association's committee, and will, we understand, be embodied in their report to be presented to the annual meeting of the Association at Philadelphia, in April. In this connection we may say that the results of correspondence on their part can hardly be deemed satisfactory. While some interesting facts have been learned, the responses, as a whole, have not been of a character to encourage active effort; and our Committee has grave doubts as to whether results of sufficient value can be obtained in this way to justify even a very moderate amount of labor.

The question of the two committees working in concert was next considered, and relative thereto we may say that, before deciding, we prefer to wait until their committee has made its report on this year's work, when the present status of the whole question can be better determined, though our present impression is there would be decided advantage in working together.

From the foregoing it will be apparent to the Society that there are difficulties of no ordinary character in the way of obtaining full information on the subject we are charged in investigating, and we doubt if anything of real value can be done except in the way of precise studies, which can only be conducted at considerable expense. To attain this there is, perhaps, a legitimate field, which may be occupied by our Committee, either acting in concert with that of the American Water Works Association or by itself, as the case may be, in the direction of agitation and presentation of the matter to the various water boards and sanitary authorities of the country, with a view of ascertaining whether an organization of all those interested can be made in such form as to lead to concentrated action and the contribution of funds enough to pay for the large amount of necessary detail work.

This phase of the question we have as yet hardly considered, but if it is the pleasure of the Society that the Committee be continued, we will endeavor to ascertain what can be done in this direction.

Respectfully submitted,

A. FTELEY,  
GEO. W. RAFTER,  
DESMOND FITZGERALD,  
*Committee.*

NEW YORK, January 21st, 1891.

## REPORT OF COMMITTEE ON AN INTERNATIONAL ENGINEERING CONGRESS.

PITTSBURGH, PA., Dec. 1st, 1890.

*To the American Society of Civil Engineers:*

Your Committee, appointed under the resolution of the Society, adopted at the business meeting of the Annual Convention, on June 28th, 1890, to meet with the representatives of other engineering societies in Chicago, to consider the establishment of engineering headquarters and the holding of an International Engineering Congress during the World's Columbian Exposition in 1893, respectfully reports:

*First.*—That they attended the meeting held on October 14th and 15th, 1890, of the representatives of the several engineering societies and clubs, as set forth in the report of the meeting submitted herewith.

*Second.*—We recommend that the action of said meeting be approved by this Society, subject to further and specific approval by the Board of Direction of this Society, of such financial plan as may be hereafter adopted.

*Third.*—That the Society appoint two members to represent it on the Permanent Committee, with two alternates, who may act as such representatives during the absence or disability of the principals.

All of which is respectfully submitted,

WM. P. SHINN,  
CHAS. L. STROBEL,  
ALFRED E. HUNT,  
*Committee.*

The following is the report of the Chicago Convention referred to in the report above.

The Convention met at 10 A.M. in the rooms of the Western Society of Engineers, 78 La Salle street, Chicago, Tuesday, October 14th, 1890. The societies represented and the delegates present were as follows:

The American Society of Civil Engineers: William P. Shinn (President), C. L. Strobel, A. E. Hunt. The American Society of Mechanical Engineers: William Forsyth, Jesse M. Smith. The American Institute of Mining Engineers: William P. Shinn, A. E. Hunt. Canadian Society of Civil Engineers: J. D. Barnett, O. Chanute. The American Institute of Electrical Engineers: E. M. Izard. The Engineers' Club of Philadelphia: H. W. Spangler, Wilfred T. Lewis, E. V. d'Inwilliers. The Civil Engineers' Club of St. Louis: J. B. Johnson, E. D. Meier, Robert E. McMath. Civil Engineers' Club of St. Paul: L. W. Rundlett, W. W. Curtis, S. D. Mason (President). Wisconsin Electric Club: Warren S. Johnson. Engineering Association of the Southwest: E. L. Corthell. Civil Engineers' Club of Cleveland: William T. Blunt, John Eisenmann. Engineers' Club of Minneapolis: William A. Pike, F. W. Cappelen. The Society of Civil Engineers, Paris, France: E. L. Corthell. The Engineers' Society of Western Pennsylvania: A. E. Hunt. The Western Society of Engineers: O. Chanute, D. J. Whittemore, E. L. Corthell, C. L. Strobel.



Several letters were read by the Secretary, and, after organization and discussion, a committee was appointed to formulate a plan and to report to the Convention, which adjourned to meet again next morning.

OCTOBER 15. The following report was submitted.

CHICAGO, ILL., October 15th, 1890.

*To the Chairman of the Convention of Delegates from Engineering Societies of the United States and Canada.*

DEAR SIR:

Your Committee on Plan for Establishing and Maintaining a Joint Engineering Headquarters in Chicago in 1893, during the World's Columbian Exposition, and for holding an International Engineering Congress at some time during the Exposition, beg leave to report:

It finds itself unable to present at this time more than a brief outline plan. The proposition advanced by the Committee of the Western Society of Engineers to this Convention yesterday embodies our views, with some changes which we have made in the plan herewith submitted.

*First.*—ENGINEERING HEADQUARTERS.

In view of the existence in this country of several large engineering societies of high rank, which will desire the use of headquarters for their own members, and for the entertainment of foreign visitors, and the inconvenience and expense which would result from the maintenance of separate establishments, we think it very desirable that all the engineering societies of recognized standing in the United States and Canada be requested to unite in establishing and maintaining a joint engineering headquarters during the continuance of the Exposition. The Exposition management will probably furnish space free of charge within the Exposition buildings, but it may be deemed advisable to provide additional quarters outside; the headquarters to be a rendezvous for all the members of the engineering societies in this country, and their use to be freely tendered to all foreign engineers. It is expected that the staff shall consist of a joint Secretary and two or more assistants, some of whom shall speak the principal European languages. The staff to be charged more especially with:

(a) To give information concerning the location of various engineering exhibits within the Exposition.

(b) To give visiting and foreign engineers information about points of engineering interest, outside of the Exposition, and to aid their investigations in other ways.

(c) To give visiting and foreign engineers introduction to those whom they may desire to meet, and to promote social intercourse.

(d) To keep a record of the addresses of visitors, and to invite them to the International Engineering Congress hereinafter outlined.

It is estimated that the expense will amount to about \$10 000. This it is suggested may be met by an assessment of \$1 per member on each engineering society of this country which shall join this proposed association, and also by voluntary contributions. The details to be hereafter adjusted. It is evident that this plan will be far more economical than that of maintaining separate headquarters by the several societies.

*Second.*—ENGINEERING CONGRESS.

At some time to be hereafter designated during the Columbian Exposition, it is proposed to hold within the Exposition, in a building which the management thereof proposes to furnish, an International Engineering Congress open to engineers of all nations. This Congress



to last six days and to be conducted in the English language. The opening session of welcome and organization to be a joint session, and if warranted by the attendance and the number of papers offered, the Congress then to be divided into sections to consider and discuss the various branches of civil, mechanical, mining, metallurgical, electrical, military and naval engineering. A Chairman and Secretary for each section to be designated in advance, and the session to be so timed that papers and discussions on allied subjects shall not occur simultaneously, so as to preclude those interested from attending several sections. The Congress to terminate with another joint session. All papers, so far as practicable, to be furnished in advance, to be carefully examined by the proper committees under rules to be hereafter laid down, and if found acceptable, to be printed for distribution in advance to members of the Congress, to which they are to be chiefly read by title so as to admit of immediate discussion. Intending contributors to be requested to confine their papers, so far as possible, to such new and recent constructions, machines, processes, methods, experiments and investigations, including proposed standards of tests and measurement, as are of engineering importance. Papers on purely speculative subjects should not be received. A small fee (say \$2) to be paid by members attending the Congress to defray its expenses. The papers and discussions to be subsequently printed and furnished to such members as may so request at a stipulated price. A Permanent Committee to be chosen in advance, to organize the above proposed headquarters and Congress.

Respectfully submitted,

E. L. CORTHELL,  
O. CHANUTE,  
JESSE M. SMITH,  
D. J. WHITTEMORE,  
C. L. STROBEL,  
W. W. CURTIS,  
J. B. JOHNSON.

The report was unanimously adopted in the following resolution:

*Resolved*, That the report of the Committee on an International Congress and Joint Headquarters be accepted, and that we report the same to our respective societies, with the recommendation that action in approval or in disapproval of the same be taken within the next two months, and that we desire the present Committee to be continued with power to carry on the correspondence and organization until its successor is appointed.

In furtherance of the plan adopted, the following resolution was passed by the Convention:

*Resolved*, That it is the sense of this Convention that the General Permanent Committee on International Congress and Engineering Headquarters be composed of one member from each of the societies which shall join in the plan, except that the American Society of Civil Engineers, the American Society of Mechanical Engineers, the American Institute of Mining Engineers, the American Institute of Electrical Engineers and the Canadian Society of Civil Engineers, may each appoint two members, and the Western Society of Engineers may appoint three members of such Committee.

The following resolutions were also passed:

*Resolved*, That the Secretary be instructed to prepare minutes of the proceedings of this Convention and the resolutions adopted, and that he,

as soon as possible, have the same printed and sent to each delegate, and the secretary of each of the societies represented.

That the Executive Committee of the Convention be empowered to call the first meeting of the delegates, provided for in the resolution adopted, at such time as they may see proper after January 1st, 1891.

JOHN W. WESTON,  
*Secretary.*

## LIST OF MEMBERS.

### ADDITIONS.

#### MEMBERS.

		Date of Election.
HAZLETON, CHARLES WILLIAM.....	Engineer Turners Falls Co., Turners Falls, Mass. ....	Jan. 7, 1891
KIMBALL, GEORGE HENRY.....	Chief Engineer Lake Shore and Michigan Southern R. R., 87 Adelbert st., Cleve- land, Ohio .....	Dec. 3, 1890
OSTROM, JOHN NELSON.....	198 Broadway, New York City.....	Dec. 3, 1890
ROOD, HENRY MARTYN.....	Assistant Engineer New York State Canals, Mechanic- ville, N. Y. ....	Dec. 3, 1890
SCOTT, CHALMERS.....	Fifth and E streets, San Diego, Cal.....	July 2, 1890
SICKELS, FREDERICK ELLSWORTH..	Chief Engineer Water Works, Kansas City, Mo.....	Jan. 7, 1891

#### JUNIORS.

DEANS, CHARLES HERBERT.....	Assistant Engineer with Sooysmith & Co., 2 Nassau st., New York City.....	Dec. 3, 1890
FOUQUET, LOUIS DOUGLAS.....	Engineer Dept., New York, Ontario and Western R. R., Walton, N. Y. ....	Jan. 7, 1891
RIGGS, CLINTON LEVERING.....	814 Cathedral st., Baltimore, Md.....	Jan. 7, 1891

### CHANGES AND CORRECTIONS.

#### MEMBERS.

APPLETON, THOMAS.....	505 Rialto Bldg., Chicago, Ill.
BALDWIN, WARD.....	University of Cincinnati, Cincinnati, Ohio.
BARNARD, A. P.....	125 East 26th st., New York City.
BASSEL, ROBERT.....	Royal Inspector of Ry. Construction and Traffic, Frankfurt a/R., Germany.
CORNELL, GEORGE B.....	Chief Engineer J. B. & J. M. Cornell Iron Works, 143 Centre st., New York City.

COVODE, JAMES H.....	English Club, Montevideo, Uruguay.
CRAIGHILL, WILLIAM P.....	Col. Corps of Engineers, U. S. A., 9 Pleasant st., Baltimore, Md.
CROWELL, J. FOSTER.....	Consulting Engineer, 18 Broadway, Room 413, New York City.
GILLHAM, ROBERT.....	45 Broadway, Room 422, New York City.
GOULD, WILLIAM T.....	Assistant Engineer Wiggins Ferry Co., Republic Bldg., St. Louis, Mo.
GRANT, WILLIAM H.....	122 West 88th st., New York City.
HENNY, DAVID C.....	People's Bank Bldg., Room 203, Denver, Colo.
HERBERT, ARTHUR P.....	Engineer and Superintendent Colima Div., Mexican National Construction Co., Colima, Mexico.
HERING, RUDOLPH .....	4400 Spruce st., Philadelphia, Pa.
JACKSON, JONES M.....	Chief Engineer for Godeffroy & How, Contractors B. and E. S. R. R., Salisbury, Md.
KINNEY, EDWARD C .....	145 S. Lincoln ave., Denver, Colo.
MCDONALD, HUNTER.....	Resident Engineer W. and A. R. R., Atlanta, Ga.
MYERS, CHARLES H.....	(Care Am. Soc. C. E.) 127 East 23d st., New York City.
NORTHWAY, WILLIAM R.....	Room 806, Chamber of Commerce Bldg., Chicago, Ill.
NOURSE, EDWIN G....	Chief Assistant to Consulting Engineer Columbian Exposition, 1143 The Rookery, Chicago, Ill.
ROCKWELL, SAMUEL.....	Room 10, Davidson Block, St. Paul, Minn.
SMITH, S. HARRISON.....	318 Pine st., Room 22, San Francisco, Cal.
STIXRUD, MARTINIUS.....	P. O. Box 281, Seattle, Wash.
TOMLINSON, ALFRED T.....	Room 606, People's Bldg., Denver, Colo.
VAN AUKEN, ALVA M .....	Essex Bldg., Room 13, Denver, Colo.

## ASSOCIATES.

HARRIS, CHARLES M.....	54 Pine st., New York City.
TRAUTWINE, JOHN C., Jr.....	3301 Haverford st., Philadelphia, Pa.

## JUNIORS.

BONNETT, CHARLES P.....	421 Westminster ave., Elizabeth, N. J.
CHADBOURN, WILLIAM H., Jr.....	U. S. Engineer's office, Beaufort, N. C.
EWING, WILLIAM B.....	4136 Ellis ave., Chicago, Ill.
FISHER, ELSTNER.....	109 Howard st., Detroit, Mich.
FURMAN, J. R .....	47 West 19th st., New York City.
POTTER, ALEXANDER.....	(Care Stanwix Engineering Co.) Rome, N. Y.
PRATT, MASON D.....	(Care Pennsylvania Steel Co.) Steelton, Pa.
TAPPAN, ROGER..	31 Mt. Vernon st., Boston, Mass.

## RESIGNATIONS.

## MEMBER.

GODWIN, BRYANT.....Date of Resignation,  
February 3, 1891

## JUNIOR.

DAY, G. FREDERICK P.....January 21, 1891

## DEATHS.

CONNOR, ADDISON .....Elected Member, January 5, 1887; died  
January 4, 1891.  
PAINE, WILLAM H.....Elected Member, May 12, 1875; died De-  
cember 31, 1890.

## ADDITIONS TO LIBRARY AND MUSEUM.

Canadian Society of Civil Engineers.  
Transactions, Vol. IV, Part 1, January to  
June, 1890.  
Cornell University.  
Register, 1890-91.  
M. G. Eiffel, Paris.  
Memoire présenté a l'appin du projet  
définitiv du Viaduc de Garabit, with  
Atlas, Paris, 1890.  
Engineers' Club of Philadelphia.  
Proceedings. Vol. VII, No. 5.  
W. R. Hutton, N. Y.  
The Washington Bridge, New York, 1890.  
William A. Ingham, Sec. Geological Survey  
of Penn.  
Atlas Southern Anthracite Field, Harris-  
burg, 1890.  
Oil and Gas Region. Harrisburg, 1890.  
Dictionary of Fossils. Harrisburg, 1890.  
Iowa Society of Civil Engineers and Sur-  
veyors.  
Proceedings 2d Annual Convention De-  
cember 27th and 28th, 1890, Glenwood.  
Iowa, 1890.  
Iowa Surveyors' Association.  
Proceedings 5th Annual Meeting, January  
8th-9th, 1889, Glenwood, Iowa, 1890.  
Iowa Surveyors and Civil Engineers' Associa-  
tion.  
Proceedings 4th Annual Meeting, December,  
1887, Glenwood, Iowa, 1889.  
J. Francis Le Baron, Nashville, Tenn.  
Florida. The underground wealth and  
prehistoric wonders of Polk and De Soto  
Counties. Barton, Fla., 1890.  
Horace Loomis, N. Y.  
An isometric view of the underground  
pipes, subways, etc., at Fulton Street and  
Broadway, New York.

Marsden Manson, Sacramento, Cal.  
Biennial Report of the Board of Harbor  
Commissioners for the fiscal years July  
1st, 1888, to June 30th, 1890.  
George S. Morison, Chicago, Ill.  
The Rulo Bridge. New York, 1890.  
Nashville Commercial Club.  
Proposed Tennessee Highway Law. Nash-  
ville, 1890.  
Arthur Pew, Valdosta, Ga.  
Sixth and Seventh Annual Reports of the  
Wrightsville and Tennille Railroad Co.  
Public Library, Cincinnati.  
Annual Reports of the Librarian and  
Treasurer for the year ending June 30,  
1890. Cincinnati, 1890.  
By purchase.  
Life of John Ericsson. W. C. Church.  
A Treatise on Masonry Construction.  
Ira O. Baker. New York, 1890.  
C. P. Sandberg, M. I. M. E.  
On Steel Rails, considered chemically and  
mechanically. London, 1890.  
Technical Society of the Pacific Coast.  
Transactions, Vol. VII, No. 4, August, 1890.  
San Francisco, 1890  
Jno C. Trantwine, Jr., Stamford, Conn.  
Recent experiments on the flow of water  
over weirs. Philadelphia, 1890.  
University of the State of New York.  
Bulletin of New York State Museum, Sep-  
tember, 1890. Building stone in New  
York.  
U. S. Department of State.  
Reports from the Consuls of the United  
States, No. 121, October, 1890.  
Special Consular Report. Refrigerators  
and food preservation in foreign coun-  
tries.

- Index to Reports from the Consuls of the United States, May to August, 1890.
- U. S. Geological Survey.  
12 maps of surveys.  
Maps of the United States.
- U. S. Board on Geographical Names, No. 1.
- U. S. Light House Board.  
Annual Report for the fiscal year ending June 30th, 1890.
- U. S. Naval Observatory.  
Magnetic observations at the U. S. Naval Observatory, 1888 and 1889.
- U. S. Navy Department.  
Report of the Superintendent of the U. S. Naval Observatory for the year ending June 30th, 1890.  
Pilot Chart North Atlantic Ocean.  
Ice in the North Atlantic, Season of 1889-90.
- U. S. War Department—Chief of Engineers.  
Specifications as follows:  
For improving Little Kanawha River, W. Va.  
For improving May Lake Channel, Mich.  
For improving Philadelphia Harbor.  
For improving Mississippi River.  
For improving Wilmington Harbor, Cal.  
For improving Wilmington Harbor, Del.  
For improving Appoquinimink River, Del.  
For improving Columbia River, Oregon.  
For improving Harbor at Agate Bay, Minn.  
For improving Big Sandy River, W. Va.  
For improving San Luis Obispo Harbor, Cal.  
For improving Bayou Terre Bonne, La.  
For improving Tongue River, Mon.  
For improving Double Bayou, Texas.  
For improving Slough at Hamilton, Ill.  
For improving Shoals on Lake Pontchartrain, La.  
For improving Bayou Cocodrie, La.  
For improving Harbor of Smithland, Ky.  
For improving Bayou Black, La.  
For improving Bayou Des Glaisses, La.  
For improving St. Leonard's Creek, Md.  
For improving Port Oxford Harbor, Oregon.  
For improving Manokin River, Md.  
For improving Smyrna River, Del.  
For improving Harbor at Ashland, Wis.  
For improving Hudson River, N. Y.  
For improving New York Harbor.  
For improving Buffalo Bayou, Texas.  
For improving Muskegon Harbor, Mich.  
For improving Saginaw River, Mich.  
For dredging in Boston Harbor.  
For dredging at Wilson's Point, Conn.  
For dredging Harbor at Thunder Bay, Mich.  
For dredging Superior Bay, Wis.  
For dredging Harbor at Back Cove, Me.  
For dredging Clinton River, Mich.  
For dredging Harbor at Bridgeport, Conn.  
For dredging Black River, Mich.  
For dredging Portland Harbor, Me.  
For enlarging jetties at Port Jefferson Inlet, N. Y.  
Breakwater at Greenpoint, N. Y.  
For removing ledge in Portsmouth Harbor, N. H.  
York Harbor, Me.  
For construction of breakwater at Moosea-bee Bar, Me.  
For building superstructure and repairs to piers at Chicago Harbor, Ill.  
For iron work for foundations of Dams No. 7 and 8, Great Kanawha River, Va.  
For steel highway draw-bridge across the tidal channel, Oakland Harbor, Cal.  
For constructing Lock No. 2, Cumberland River.  
For materials for Fort Monroe, Va.
- For constructing Buckridge Levee, Mississippi River.  
For constructing breakwater at Bridgeport, Conn.  
For constructing stone jetty at the mouth of Saco River, Me.  
For removing wrecks "M. E. Trenille" and "Ben Hur."  
Report in reference to the commerce passing St. Mary's Falls Canal during the season of 1890.  
Report of the examination of Nottaway River, Va.  
Report of the examination of Alsea Bay and River, Oregon.  
Report of the examination of Shaw's Cove, Conn.  
Report of the examination of Harbor of Refuge at Santa Cruz, Cal.  
Report of the examination of Connecticut River, Conn.  
Report of the examination of ship channel between Port Townsend Bay, Puget Sound, and Oak Bay, Wash.  
Report of the examination of the Colorado River.  
Report of the examination of Linchester River, Md.  
Report of the examination of Sullivan Falls, Me.  
Report of the examination of Nanticoke River, Md.  
Report of the examination of Mississippi River at Warsaw, Ill.  
Report of the examination of Drum Inlet, N. C.  
Report of the examination of Little Pigeon River, Tenn.  
Report of the examination of Alabama River, Ala.  
Report of the examination of Patapsco River, Md.  
Report of the examination of Princess Bay, N. Y.  
Report of the examination of water way between Pamlico and Bay River, N. C.  
Report of the examination of water way from Pungo River to Sladesville, N. C.  
Report of examination of White Oak River, N. C.  
Report of examination of Elk River, West Va.  
Report of examination of Sucanchoche River, Ala.  
Report of examination of Rouge River, Mich.  
Report of examination of Chattahoochee River, Ala.  
Report of examination of Sebewaing River, Mich.  
Report of examination of Newport Creek, Md.  
Report of examination of Bayou Black, La.  
Draft of rules and regulations for the navigation and use of the locks and canals of Fox River, Wis.  
Statement in regard to the civilian engineers employed from July 1, 1889, to June 30, 1890, in the work of improving the rivers and harbors.
- U. S. War Department, Chief Signal Officer.  
Monthly weather review. Nov., 1890.
- U. S. War Department, Ordnance Bureau.  
Notes on the Construction of Ordnance No. 55. Hydro-pneumatic gear for siege and heavy ordnance.
- Cesare Zanetti, N. Y. *Catologo di Istrumenti Scientifici.* A. Salmoiraght.



# American Society of Civil Engineers.

---

## PROCEEDINGS.

---

Vol. XVII.—February, 1891.

---

### MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

---

#### OF THE SOCIETY.

FEBRUARY 4TH, 1891.—The Society met at 20 o'clock, Director Charles B. Brush in the chair; F. Collingwood, Secretary. Ballots were canvassed, and the following candidates were declared elected. As Members: Patrick John Flynn, Tulare, Cal.; Conway Bethune Hunt, Washington, D. C.; Norton Longstreth Taylor, Tacoma, Wash. As Juniors: Maurice Augustus Vielé, New York City.

A paper by W. C. Ambrose, M. Am. Soc. C. E., on "The Use of Asphaltum in Building Sea Walls," was read by the Secretary and discussed by Messrs. E. H. Wooton, Flagg, Cooper, North, F. V. Greene and Frith.

A paper by N. J. Conover on "The Howe Strut Problem," was presented and read by title.

FEBRUARY 18TH, 1891.—The Society met at 20 o'clock, Vice-President A. Fteley in the chair; F. Collingwood, Secretary.

A paper by John R. Freeman, M. Am. Soc. C. E., on "The Nozzle as an Accurate Water-Meter," was read by the Secretary and discussed by Messrs. W. Barclay Parsons, Fteley, Brush, Flagg and Fred. H. Baldwin.

The Secretary exhibited a photograph received by one of his assistants from Mr. Henry C. Simpson, of Horschay, Shropshire, England, with the following memorandum:

"This is the first iron bridge ever made. It was opened for traffic in 1779, and continues a most serviceable structure to this day and gives the name to the town of Ironbridge, Eng. The span of center arch is

100 feet, weight about 378 tons. The ribs were cast at Coalbrookdale in two segments only. Robert Stevenson said of the structure: 'If we consider that the manipulation of cast-iron was then completely in its infancy, a bridge of such dimensions was doubtless a bold as well as an original undertaking, and the efficiency of the details is worthy of the boldness of the conception.'"

### OF THE BOARD OF DIRECTION.

JANUARY 6TH, 1891.—Applications were considered. The Secretary presented a draft of the annual report. Letters from Members declining nomination for officers were presented.

JANUARY 20TH, 1891.—The Secretary presented the draft of the annual report, which was considered, accepted and approved. Report of the Treasurer presented, adopted and ordered read at the Annual Meeting.

JANUARY 22D, 1891.—In accordance with the provisions of the Constitution, the President appointed the following Standing Committees:

On Finance.—Messrs. Clemens Herschel, Charles B. Brush and S. Whinery.

On Library.—Messrs. Rudolph Hering, F. Collingwood and Edward P. North.

The Secretary was authorized to continue the Society work on the basis of the appropriations for the first quarter of 1890.

FEBRUARY 3D, 1891.—Applications were considered. The time and place of the Annual Convention were considered.

The following notice was ordered printed on all future "blue lists":

"Members are requested to correspond with the Board of Direction in regard to the candidates upon the following list."

---

## MEMOIRS OF DECEASED MEMBERS.

---

**OTHO ERNEST MICHAELIS, Mem. Am. Soc. C. E.\***

---

**DIED MAY 1ST, 1890.**

---

In the death of Major Otho Ernest Michaelis, on the night of May 1st, 1890, the American Society of Civil Engineers lost one of its highest ornaments and most useful members, while those of its membership who enjoyed his acquaintance mourned a gifted companion and a most valued friend. At the time of his death he was a Major in the Ordnance

---

\* Committee on Memoir, Mr. William P. Shinn, Past President Am. Soc. C. E.

Corps of the United States Army (having been the first officer of that corps appointed from civil life), and he was in command of the arsenal at Augusta, Me.

Otho Ernest Michaelis was born in Germany (the locality not being given in the War Department records) on August 3d, 1843. His relatives of his own name in Germany were people of intellect and education, his father having been a University man. His uncles were lawyers and men of influence, and his mother's relatives were people of great wealth for that time and place. His father was a highly educated, clever, but unsuccessful man. His parents came to this country when Otho was a babe, and they struggled with poverty and illness until the father died in New York at the age of sixty.

Otho was, as a child at the public schools, so bright and promising that he attracted the attention and interest of several men of prominence, through whose influence he was sent to the Free Academy, now known as the College of the City of New York. He was very young, and his mother in her poverty felt that she needed his help, for she took him from the Academy and put him in a store. Three of the professors, feeling that it would be a pity to have such a career blighted, went to Mrs. Michaelis, and offered to educate Otho from the Student Fund, giving the family \$200 a year, which was more than he could earn, and which he might repay in after years. One of them, Professor Alfred G. Compton, still lives, and is an honored member of this Society. His friendship for young Otho has endured for life, and is one of the precious possessions of the surviving members of the family, while Otho's love for him continued to the end.

It deserves to be recorded that Otho, by much economy and privation, repaid the Student Fund \$200 before and \$600 after his marriage. He graduated from the Free Academy in July, 1862, at the age of nineteen, at the head of his class, with the degree of A.B. Among his many friends was Mr. Abram S. Hewitt, now President of the American Institute of Mining Engineers, who offered Otho a position in the Iron Works, or a letter of introduction to Captain Dyer of the U. S. Army, advising him to accept the former; but patriotism was strong in the boy's nature, and early in 1863 he enlisted as a private in the 23d Regiment, N. Y. N. G., with which he participated in the Gettysburg campaign.

In September 1863, he was appointed Second Lieutenant in the Signal Corps U. S. A., and on November 24th, 1863, he was commissioned Second Lieutenant in the Ordnance Corps, with which he served until his death. This appointment was made after a competitive examination as to special fitness for that branch of the service, he being the first to enter this branch of the service without a training at West Point Military Academy. He was assigned to duty at the Watertown Arsenal (near Boston, Mass.), under General Thomas J. Rodman, and put in charge of the various shops and building operations then being con-

ducted. In April, 1864, he was transferred to St. Louis Arsenal, and in June, 1864, he was assigned to duty in the field to the command of the Ordnance Depot at Chattanooga, Tenn., with the rank, on General George H. Thomas' staff, of Chief of Ordnance, where he remained until December, 1864. On September 12th, 1864 (being then just past twenty-one years of age), he was promoted to be First Lieutenant, and on March 13th, 1865, he was breveted Captain, for "faithful and meritorious service." He was at Watervliet Arsenal in December, 1864, and January, 1865; in command of Detroit Arsenal January to October, 1865, and was then transferred to Watervliet Arsenal, then the largest and most important arsenal in the United States, where, in addition to the manufacture of ordnance supplies, which was carried on very extensively, many important engineering operations were conducted under his immediate charge. During 1868 he was granted leave of absence, which he improved by a visit to Europe, utilizing it in the study of his profession. Soon after his return, on December 29th, 1868, he was married in Detroit, Mich., to Kate Kercheval Woodbridge, only daughter of the late Captain Francis Woodbridge, U. S. Artillery, who was breveted Major for gallant conduct in the Mexican war.

Rising through regular gradations in the service, he became Captain in the Ordnance Corps, June 23d, 1874. He had shared in the Atlantic and Nashville campaigns, where his merits attracted the attention of his superior officers. He was devoted to his profession, and his scientific genius and vast acquirements as a scholar were freely given to the service of his country. He was master of several languages, and by this means he was brought into correspondence with many of the ablest ordnance officers in the services of Europe. As the result of this intercourse, he received from Major Boulenger, of the Belgian Army, one of the then new electric chronographs, invented by that officer for exact measurement of the velocity of projectiles. This was the first chronograph that was introduced into our army and navy, and it marks the improvement in rifled arms and artillery, which, since the Franco-German war, has compelled the re-arming of both the French and German armies at least twice, and similar changes in other armies. In like manner, the navies of the world have been obliged to change their ordnance and defensive armor. To clearly demonstrate the usefulness of this chronograph, which had superseded the ballistic pendulum in every army but ours, Captain Michaelis undertook a series of experiments at the Watertown Arsenal (which he was allowed by a grateful Government to conduct at his own expense), the results of which were embodied in his first book, entitled "Le Boulenger Chronograph," published by Van Nostrand in 1872, which he dedicated to his "facile princeps," General T. J. Rodman. This treatise conclusively demonstrated the excellence of the new system, and September 22d, 1875, Captain Michaelis was assigned to conduct the experiments on Nut Island, Boston Harbor, with

Wiard's 12 inch rifled guns, assisted by Lieutenant Henry Lyon. This service occupied about two months, and early in 1876 he made a report on the matter to the Navy Department. This new departure in scientific ordnance is to be in large part accredited to the intelligent zeal, persistent energy and scientific knowledge of this officer.

The Committee of Pensions of the United States Senate bore him testimony, as follows:

"At a very early date and with great foresight and zeal, he urged the establishment of a Government factory for making heavy guns of the most advanced system, at a time when we had not in this country a single establishment capable of producing even the steel ingots required for a 6-inch rifled gun, but had to send to Krupp, Armstrong or Whitworth for such material. He demonstrated as an expert, before the Military Committee of Congress, so clearly the capabilities and advantages of the location of the Watervliet Arsenal, where he had been twice stationed, that Congress made the necessary appropriations; and the result is that we are now producing not only the grade of steel required, but are making heavy guns, equal to the best of their class in Europe. The nation has suffered a loss in the death of this man of learning and ideas in his mid-career of usefulness, and of a devotion to duty so great that he seemed entirely indifferent to his own temporal advantages."

This commendation is not undeserved, but it should be recorded that because Captain Michaelis' ideas did not accord with those of the ruling circle in his corps, he was deprived of the opportunity of assisting with his ability and scientific attainments in the development of the gun factory at Watervliet (a duty that would have been most congenial to his tastes), and he was shelved at Augusta, where there was no work to do and no scope for his genius and knowledge.

To continue his military record, he was in command of the Detroit Arsenal from January to October, 1869, and was then transferred to Watertown Arsenal and placed in charge of the various works pertaining to the ordnance service, where he remained until September, 1873. During the four years that he was stationed there, Captain Michaelis made many important experiments in testing metals, conducted the inspection of guns and carried to completion the erection of furnaces and gas works necessary for the use of the arsenal. He was at Allegheny Arsenal (Pittsburgh, Pa.), from September, 1873, to November, 1875, and from January, 1876, to September, 1880, he was chief ordnance officer of the Department of Dakota, on the staff of General Terry. While serving in this capacity he took part in the campaign against the hostile Indians in Dakota and Montana, from May until November, 1876, and he was among the first to arrive on the Custer battlefield at Little Big Horn River after the fight of June 25th, 1876, in which General Custer and his whole command lost their lives.

From September, 1880, to November, 1884, Captain Michaelis was



stationed at Frankford Arsenal (Philadelphia), where he distinguished himself by many improvements in the machinery and appliances in use. On July 7th, 1881, he accompanied Professor S. P. Langley on his celebrated expedition to Mt. Whitney, Captain Michaelis being in charge of the signal apparatus and authorized to establish a signal-station there. He performed this arduous and exacting service in such a manner, as to win Professor Langley's most cordial and appreciative approbation.

From November, 1884, to July 1st, 1887, he was again assigned to duty at Watervliet Arsenal, and on July 1st, 1887, he was placed in command of the Augusta (Maine) Arsenal, which position he held at the time of his death.

He was promoted to the rank of Major on February 28th, 1889.

While in service of the many posts to which he was assigned, he made many valuable improvements in methods and machinery, which marked his progress from arsenal to arsenal. His sliding-target was favorably reported upon; his tent and field-kit combined was pronounced a success by those who used it; while his powder-charger—the "Michaelis Charger"—both bench and hand, is issued to the troops regularly. With the men under his command he was always a great favorite, and he had great influence with them; the love they bore him was a great cause of satisfaction to him, and he always wished to bring the army nearer to the people. Since his death, his grave, until snow fell, was never without flowers, placed there by the men of his command. General George H. Thomas, his commander in the Army of the Tennessee, wrote a letter recommending that he be then breveted Major—a mark of high appreciation and esteem for so young a man—but the recommendation was simply pigeon-holed in Washington.

Major Michaelis was elected a member of this Society on May 6th, 1874, while stationed at Allegheny Arsenal. After his return from the Department of Dakota in 1880, he took an active part in the work of the Society, attending most of its general meetings and rendering much valuable assistance to the Secretary at the Annual Conventions. Few who attended the Minneapolis Convention, in June, 1883, will fail to remember his efficient service in organizing the subsistence department during the trip. At the time of his death he was a member and Secretary of the Committee on Revision of the Constitution and By-Laws, and he had been present and rendered valuable aid to the Committee at every meeting. He had contributed to the Society several valuable papers, as follows: "A Peculiar Phase of Metallic Behavior;" "Meteorological Investigation;" "The Heavy-Gun Questions;" "Note on the Cost of Concrete;" "Lime Sulphite Fiber-Manufacture in the United States," besides furnishing valuable discussions upon many papers read by other members.

His views upon the question of cast-steel guns—that they were cheaper and could be made better than the hammered-steel or "built-

up" guns—were very pronounced, and were the cause of much unjust criticism and discrimination against him in the Ordnance Department—but experience will show him to have been right, and that at no very distant day. It was a source of great grief to him that his efforts to improve his corps were so little appreciated, and that his researches and expressions of opinion brought him obloquy rather than honor.

His family relations were of the most pleasant. The fruits of his marriage were eight children, of whom six survive him. His oldest son died in his eighteenth year, cutting short a career of unusually bright promise and bringing sorrow to his household. The death of his daughter by drowning in December, 1889, was the proximate cause of his own demise, as in his efforts to save her he became chilled and insensible, and was only saved from being himself drowned by the heroic efforts of his third son Francis, only fourteen years old, who sustained his father until help arrived, and both were rescued. Major Michaelis was insensible when taken from the water, and it was a work of some hours to resuscitate him. He hovered between life and death for two weeks; but finally his naturally strong constitution prevailed, and he seemed to have recovered his wonted vigor.

On April 16th, 1890, he attended the re-union of the Loyal Legion in Philadelphia, and appeared to be in health; but on his return to Augusta, he was seized with an inflammation of the spinal cord, a result of his exposure and treatment in December, and on the night of May 1st he breathed his last. His devoted wife survives him; and she and the six surviving sons and daughters have the sympathy of all who knew Major Michaelis for the brave soldier, the accomplished scientist, the affectionate husband and father, and the always reliable friend.

---

CHARLES ACKENHEIL, M. Am. Soc. C. E.\*

---

DIED JUNE 20TH, 1890.

---

Charles Ackenheil was born in Baden-Baden, Germany, in the year 1841, and at the age of fifteen entered the Polytechnic School at Carlsruhe. After a thoroughly successful course, he was graduated at the State examination in 1863. From 1863 to 1867 he was Assistant Engineer on the Black Forest Railroad between Hornberg and Triberg, which was then under construction. After some years, thus occupied, his thoughts turned to America, and his wishes having obtained fruition he left Ger-

---

\* Committee to prepare memoir, Sebastian Wimmer, M. Am. Soc. C. E.

many for the New World. Arriving here in October, 1867, he presented, June 5th, 1868, a letter of introduction from a friend to Sebastian Wimmer, then a resident of St. Mary's, Elk County, Pa., who had recently returned from London, England, where he was called, on account of his engagement on Vera Cruz and Mexico City Railroad, which had come to a temporary stop owing to the execution of Emperor Maximilian, and was then locating the eastern division of what is now called "The Low Grade Division of the Allegheny Valley Railroad." This meeting formed a link in a friendship, the chain of which was only severed by death. Mr. Ackenheil remained some time with Mr. Wimmer at his office at Driftwood, Cameron County, Pa., when a more lucrative position presented itself on the Baltimore and Ohio extension to Chicago, with Chief Engineer Randolph. He was married at St. Paul's Cathedral, Pittsburgh, Pa., on April 16th, 1872, to Miss Annie Scully, daughter of John D. Scully, Esq., cashier of the First National Bank of that city. On Mr. Wimmer's appointment, September 17th, 1877, as Chief Engineer of the Pittsburgh and Lake Erie Railroad, Mr. Ackenheil was again associated with him as his principal Assistant Engineer, until the completion of said railroad in spring of 1879. After this engagement he was principally on the Baltimore and Ohio Railroad, and finally, in November, 1885, was placed in charge of the Kill von Kull Bridge, and was made Acting Chief Engineer of the extension of said railroad from Bound Brook to Staten Island, the system known as the New York Terminals of the Baltimore and Ohio Railroad, under General Manager Frank S. Gannon. Whilst on that work he lived at Elizabeth, N. J. He lost his wife there December 14th, 1887, from a severe attack of congestive chill. Mr. Ackenheil was a man who could never pass unnoticed in his profession, and who gained many friends in the relations of social life. Well versed in all that pertained to his duties as an engineer, he was also a thorough musician, and it was one of his greatest pleasures to call around him at the piano "his little German band," as he endearingly designated his children, each one of whom bore well his little part to the harmonious accompaniment of their father. He was a devoted husband and father, a firm friend, and valued member of the Am. Soc. C. E., to which he was admitted February 2d, 1887. His sad death was the result of the fatal accident which occurred at Childs' Station, Philadelphia Division of the Baltimore and Ohio Railroad, Friday morning, at 2 o'clock, June 20th, 1890, and was received by his friends with feelings of inexpressible grief. Mr. Ackenheil left five interesting children, who will be cared for by his father-in-law, to whose home they were taken when the body of their father was borne thither, to be laid beside the remains of his wife in St. Mary's Cemetery, Pittsburgh, Pa.

## LIST OF MEMBERS.

## ADDITIONS.

## MEMBERS.

		Date of Election.
BROWN, CHARLES IRWIN.....	Engineer St. Louis and San Francisco Ry., St. Louis, Mo.....	Jan. 7, 1891
HUNT, CONWAY BETHUNE.....	Assistant Engineer, District Building, Washington, D. C.	Feb. 4, 1891
PIKE, WILLIAM ABBOT.....	University of Minnesota, Minneapolis, Minn.....	Dec. 3, 1890
WESTINGHOUSE, GEORGE, Jr. ....	Pittsburgh, Pa.....	Jan. 7, 1891

## CHANGES AND CORRECTIONS.

## MEMBERS.

ECKERT, EDWARD W.....	34 West Thirty-eighth st., New York City.
FULLER, FRANKLIN I.....	Box 653, Portland, Oregon.
MCCOLLOM, THOMAS C.....	Civil Engineer, U. S. N., U. S. Navy Yard, Portsmouth, N. H.
NEARING, FRANK.....	16 East Seneca st., Buffalo, N. Y.
PIHL, OLAF R.....	Oregon Bridge Co., Finsworth Block, Portland, Oregon.
REECE, BENJAMIN.....	311 Phoenix Building, Chicago, Ill.
ROWE, SAMUEL M.....	324 Willow ave., Topeka, Kans.
SEARLES, WILLIAM H.....	10 Wall st., Room 10, New York City.
SMITH, HAMILTON, Jr.....	30 St. Swithin's Lane, London, E. C., England.
TEMPLE, ROBERT H.....	Chief Engineer G. C. & N. Ry., Athens, Ga.
VAN SANT, ROBERT L.....	Hotel Bozier, Thirteenth and Olive sts., St. Louis, Mo.
WILLARD, JAMES E.....	103 Broadway, Cincinnati, Ohio.

## JUNIORS.

FOLWELL, A. PRESCOTT.....	933 Broad st., Newark, N. J.
POTTER, ALEXANDER.....	Stanwix Engineering Co., Rome, N. Y.
ROEHM, GEORGE E.....	36 Ferry ave., Detroit, Mich.

## BOOK NOTICES.

It is intended, in the future, to note the contents of such books relating to Engineering and allied sciences as may be sent by publishers for the use of the Society. Publishers sending books will kindly mention price.

## LESSONS IN APPLIED MECHANICS.

By JAMES H. COTTERILL, F.R.S., and JOHN HENRY SLADE, R.N.,  $4\frac{1}{2} \times 6\frac{1}{2}$  inches, cloth, pp. xiv + 512. Table of contents. No index. Macmillan & Co., London and New York, 1891. (Price, \$1.25.)

This is stated in the preface to be a rewritten and rearranged abridgment of Mr. Cotterill's *Applied Mechanics*. Fourteen pages are devoted to Mensuration and Curve Construction; 245 pages to Principles of Work; 202 to Strength of Materials and Construction; and 50 to Hydraulics.

The book was written for use at the Engineer School at Keyham, Eng., and there are over 250 examples and 377 figures.

## PRELIMINARY SURVEY AND ESTIMATES.

By THEODORE GRAHAM GRIBBLE, C.E.,  $5 \times 7$  inches, cloth, pp. xix + 420. With glossary, subject index and index to tables. Longmans, Green & Co., London and New York, 1891. (Price, \$2.25.)

The title to this book covers a wide range, for it is made to include the whole science of surveying. The several chapters of the book are devoted to General Considerations, Route Surveying or Reconnaissance, Hydrography and Hydraulics, Geodetic Astronomy, Tacheometry, Chain Surveying, Curve Ranging with Transit and Chain, Graphic Calculation and Instruments.

The object in view, as stated in the introduction, is to present to the young engineer a handy *vade-mecum* which, with the necessary tables, will enable him to carry out a survey in a new country rapidly, correctly and according to the ideas and requirements of the people. It is also intended to furnish an *aide-memoire* to the experienced surveyor for his assistance in roughly estimating the cost of proposed works, and to guide his decision in the case of alternative routes and situations.

## RUBBER HAND STAMPS AND THE MANIPULATION OF RUBBER.

By T. O'CONOR SLOANE, A.M., PH.D.,  $4\frac{1}{2} \times 6\frac{1}{2}$  inches, cloth, pp. viii + 142. Fully illustrated, with index. Norman W. Henley & Co., New York, 1891. (Price, \$1.)

This is a practical work on a subject of which comparatively little is known, outside of the trade. It treats of the sources, natural history and collection of India rubber, and of the manipulation of masticated and vulcanized rubber. It also gives directions as to the manufacture of stamps and types, and of the Hektograph or Papyrograph. Two of its eighteen chapters are given to recipes for the manufacture of rubber cements and stamping-inks.

## THE THEORY AND PRACTICE OF SURVEYING.

Designed for the use of Surveyors and Engineers generally, but especially for the use of Students in Engineering. By J. B. JOHNSON, C.E., Professor of Civil Engineering, Washington University, etc., etc. Seventh revised and enlarged edition,  $6\frac{1}{2} \times 9\frac{1}{2}$  inches, cloth, pp. xxv + 730, with index. John Wiley & Sons, New York, 1891. (Price, \$4.)

This is the seventh edition of Mr. Johnson's work on Surveying, and it contains many additions of practical importance. It embraces in its scope the whole field of Land, Topographical, Railroad, Hydrographic, Mining, City and Geodetic Surveying, and gives full information in these different branches of the science. The Projection of Maps, Map-Lettering and Topographical Symbols are also treated of, as well as Surveying Instruments and their practical use.

The appendices deal with the Judicial Functions of Surveyors, Instructions to U. S. Deputy Mineral Surveyors, Derivation of Geodetic Formulæ, etc., and a series of tables gives Trigonometric Formulæ, Logarithms, Stadia Reductions, etc.



**WEDDING'S BASIC BESSEMER PROCESS.**

By DR. H. WEDDING. Translated from the German by WILLIAM B. PHILLIPS, Ph.D., and ERNST PROCHASKA.  $6\frac{1}{2} \times 9\frac{1}{2}$  inches, cloth, pp. v + 224, with index. Scientific Publishing Company, New York, 1891. (Price, \$3.50.)

So many changes in metallurgical science were wrought by the discovery of the basic process for the manufacture of steel, that the author of this work deemed it proper, as he states in the introduction, to give a detailed description and a critical investigation of the apparatus employed and the general operation involved in carrying on the process. The translation is by Prof. Phillips, of the University of Alabama, and Ernst Prochaska, Met. Eng.

The chapters of the work are given to Early Dephosphorizing Methods, The Basic Lining, Construction and Lining of the Converter, The Material, The Basic Bessemer Process, The Chemical and Physical Reaction, General Arrangement of Basic Bessemer Slag, Dephosphorization in the Open Hearth, and Economic Results. A supplementary chapter on Dephosphorization in the Basic Open-Hearth Furnace is added by Mr. Prochaska. The work is well printed and profusely illustrated.

**THE METALLURGY OF STEEL.**

By HENRY MARION HOWE, A.M. (Harvard), S.B.,  $11 \times 11$  inches, cloth, pp. xiv + 392. Volume 1. Second edition, revised and enlarged, with many illustrations, index and list of tables. The Scientific Publishing Company, New York, 1891. (Price, \$10.)

The first edition of this work was exhausted in six weeks, and this edition was called for by the demand of metallurgists and the manufacturers of steel. It is an important contribution to the literature of metallurgy, and is exhaustive in its character. The table of contents shows a comprehensive treatment of the subject. From the headings of the chapters are: Classification and Constitution of Steel, Carbon and Iron Hardening, Iron and Silicon, Iron and Manganese, Iron and Sulphur, Chromium, Tungsten and Copper, Iron and Oxygen, The Absorption and Escape of Gas from Iron, Cold Working, Direct Processes, Charcoal Hearth Process, and Apparatus for the Bessemer Process.

The work is a large, well-printed quarto, and shows excellent taste on the part of the publisher. The excellence of the work is vouched for by many prominent authorities.

**PLANE AND SOLID GEOMETRY.**

A complete course in the elements of the science, by EDWARD BROOKS, A.M., Ph.D.,  $6 \times 8$  inches, cloth, pp. 415. Christopher Sower Company, Philadelphia. (Price, postage paid, \$1.50.)

This contains, in addition to the ordinary geometric propositions, notes on Method of Limits, a supplement on Maxima and Minima, various practical examples, and problems for solution and for construction.

---

## ADDITIONS TO LIBRARY AND MUSEUM.

---

From American Bankers' Association, N. Y. :  
An Address before the Convention at  
Saratoga, September 3d, 1890, by  
Edmund P. James.

From Astor Library, N. Y. :  
Forty-second Annual Report of the  
Trustees of the Astor Library, for the  
year 1890.

From Board of Railroad Commissioners,  
Conn. :

Thirty-eighth Annual Report of the Rail-  
road Commissioners of the State of  
Connecticut, for the year ending June  
30th, 1890.

From Wm. H. Brown, Chief Engineer Penn.  
R. R. Co. :

Record of Transportation Lines owned  
and operated by and associated in in-  
terest with the Pennsylvania Railroad,  
for the year 1890.

From California State Mining Bureau :

Tenth Annual Report of the State  
Mineralogist, for the year ending  
December 1st, 1890. Preliminary  
Geological and Mineralogical map of  
California.

From Congrès International des Procédés de  
Construction, Paris, France :

Comptes Rendus des Seances et Visites  
du Congrès.

From Prof. Thomas Egleston, Columbia  
College, N. Y. :

International Conference held at Wash-  
ington for the purpose of fixing a Prime  
Meridian and a Universal Day, October  
1884. Protocols of the proceedings.

From Engineers' Society of Western Pennsylv-  
ania :

Final Report of Committee on Roads, with  
draft of proposed road, etc.

- From Hon. Roswell P. Flower, M. C.:  
Letter from the Secretary of War transmitting letter of the Chief Signal Officer on the Rain-fall of the Pacific Slope, and the Western States and Territories.
- From Theodore Graham Gribble, N. Y.:  
Preliminary Survey and Estimates.
- From J. Francis Le Baron, Mandarin, Fla.:  
Map of Jacksonville, Fla.  
Map of Brevard Co., Fla.  
Map of Duval Co., Fla.  
Map of Muscle Shoals Canal, Tenn.  
Military Map of Chattanooga, Tenn.
- From Macmillan & Co., New York:  
Lessons in Applied Mechanics.
- From Ernest Pasquier, Professeur à l'Université de Louvain:  
Sur l'unification de l'heure: l'état actuel de la question.  
La Belgique et l'heure de Greenwich.
- From Oscar W. Petri, New York:  
Die Tätigkeit der preussischen Wasserbau-Verwaltung innerhalb der Jahre 1880-90.  
Die See-Feuer der Deutschen Küsten, von L. A. Veitmeier.
- From Robert Surtees, Ottawa, Can.:  
Ottawa Water Works. Annual Report of the Water Works Committee for the year ending October 31st, 1890.
- From U. S. Coast and Geodetic Survey:  
Report showing the Progress of the Work during the fiscal year ending with June, 1888.
- From U. S. Department of State:  
Reports of the Consuls of the United States, No. 122, November, 1890.  
Special Consular Reports. European Immigration.
- From U. S. Navy Department, Hydrographic Bureau:  
Pilot Chart of the North Atlantic Ocean.
- From U. S. Post Office Department:  
Annual report of the Postmaster-General of the United States for the fiscal year ending June 30th, 1890.
- From U. S. War Department, Chief of Engineers:  
Proposals and specifications, as follows:  
For construction of dam and shore protection in vicinity of Prairie du Chien, Wis.  
For constructing and repairing dams and shore protections between Read's Landing, Minn. and Minneisaa, Minn.  
For constructing dams and shore protection between Bellevue, Iowa, and Savannah, Ill.
- For construction of pile jetties at Fort Monroe, Va.
- For four valve-frames for the lock at St. Mary's Canal, Mich.
- For pile and stone dike at Livingston Point, Ky.
- For construction of concrete bridge piers in tidal canal, Oakland Harbor.
- For improvement of harbors, as follows:  
Benton, Mich.; Black Lake, Mich.; Brunswick, Ga.; Charlevoix, Mich.; Duluth, Mich.; Frankfort, Mich.; Grand Haven, Mich.; Manistee, Mich.; Muskegon, Mich.; Oakland, Cal.; Pentwater, Mich.; Portago Lake, Mich.; St. Joseph's, Mich.; South Haven, Mich.; White River, Mich.
- For improvement of creeks and rivers, as follows:  
Alloway, N. J.; Delaware, Del.; Hampton, Va.; Maurice, N. J.; Potomac, Va.; Rancocas, N. J.; Trinity, Texas.
- For dredging in Huntington Harbor, N. Y.; New Haven Harbor, Conn.; Mackey's Creek, N. C.; Mystic River, Conn.; Thames River, Conn.; Potomac River, Wash., D. C.
- For hire of dredging plant for improvement of Housatonic River, Conn., and Connecticut River, Conn.
- For removal of wrecks in Chesapeake Bay, and Coos Bay, Oregon.
- For dikes and dams in Ohio River; near Smithland, Ky.; Livingston Point, Ky.
- Reports of the examination of Bayou Castor, La.; Bayous Tigre and Chevreuil, La.; Berwick's Bay, Ga.; Boat on No. 4 Channel, Fla.; Cane River, La.; Current River, Missouri; Gunter's Creek, Ala.; Indian River, Fla.; Lubec Channel, Me.; Mississippi River at Clinton, Iowa; Narragansett Bay Channel, R. I.; Newport Harbor, R. I.; Ohio River between the mouth of Green River, Ky., and Evansville, Ind.; Owensboro Harbor, Ky.; Saugatuck River, Conn.; Ship Channel between the great lakes; Stony Creek River, Conn.; Taugier Harbor, Va.; Tionesta Creek, Pa.; Town River, Mass.; Watch Hill Cove, R. I.
- From Welton & Bonnett, Waterbury, Conn.:  
Annual Report of the City Engineer of Waterbury, Conn., for the year 1890.  
Twenty-fourth Report of the Board of Water Commissioners of Waterbury, Conn., for the year ending December 31st, 1890.
- From Benezette Williams, Seattle, Wash.:  
Report on Water Works for the City of Seattle, Washington.

# American Society of Civil Engineers.

---

## PROCEEDINGS.

---

Vol. XVII.—March, 1891.

---

## MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

---

## OF THE SOCIETY.

MARCH 4th, 1891.—The Society met at 20 o'clock, Vice-President Fteley in the chair; F. Collingwood, Secretary. Ballots were canvassed and the following candidates declared elected: As Members: John Anderson Bensel (elected Junior September 2d, 1885), New York City; Wilfred Emory Cutshaw, Richmond, Va.; George Lincoln Dillman, Winlock, Wash.; Francis Lowell Hills, Wilmington, Del.; George Alexander Just (elected Junior, September 3d, 1884), New York City; James Loring Lusk, Washington, D. C. As Juniors: Oscar Ellsworth Selby, Louisville, Ky.; John Godfrey Spielman, Paterson, N. J.

The letter-ballot on the adoption of the new Constitution was canvassed with the following result: Total number of ballots received, 337: ballots without signature, 4; not entitled to vote, 4; total number found correct and counted, 330. Upon the first eleven pages of the Constitution as submitted, there were: Votes in the affirmative, 289; votes in the negative, 35. This Constitution having been regularly submitted and

having received an affirmative vote of two-thirds of all the ballots cast, was declared adopted.

Upon the following Article relating to Local Associations:

#### ARTICLE IX.—LOCAL ASSOCIATIONS.

1.—Upon the application of Corporate Members desiring to organize branches of the American Society of Civil Engineers, the Board of Direction may authorize such branches at points where in its judgment the membership is sufficiently large to warrant a local organization.

2.—Such branches, whose membership shall be limited to the various grades of members of the American Society of Civil Engineers, may adopt constitutions, elect officers, fix the local dues to be paid by their members, buy or lease property in their own names, appoint and hold meetings, establish libraries and reading-rooms, and do such other things as may be deemed necessary to promote their usefulness and as may not be inconsistent with the general policy of the Society, or repugnant to the Constitution, as may be determined by the Board of Direction. But such branches shall take no action and incur no liability in the name of the Society.

3.—Each branch shall send to the Secretary of the Society every paper accepted by the Managing Board of said branch, and after the approval of the paper by the Committee on Publication, it may be published as provided in Section 12 of Article VI.

A copy of every paper read before the Society shall also be sent, when printed, to each branch, for its library.

The discussions held at the several branches shall be forwarded to the Secretary, edited by him, and the substance thereof may be published in the usual manner.

4.—The Board of Direction is authorized to formulate from time to time the necessary rules for carrying into effect the provisions of this Article.

5.—The Board of Direction may, whenever it deems it proper, enter into relations with other scientific or professional societies with a view of exchanging papers and discussions.

6.—After the establishment of such relations, the Board of Direction may authorize the issue of the Transactions and separate papers to these societies in such quantities as they may desire at favorable rates, or in exchange for the publications of said societies.

There were in the affirmative 182 votes; in the negative 139 votes. This proposed Article having been regularly submitted, and not having received an affirmative vote of two-thirds of all the ballots cast, was declared not adopted.

The Constitution as now adopted forms part of these Proceedings. (See page 146.)

The Secretary announced the death, on February 23d, 1891, of John Lawler, F. Am. Soc. C. E.

A paper on "A Cofferdam or Caisson without Timber or Iron in its Construction," by Robert L. Harris, M. Am. Soc. C. E., was read by the author and discussed by Messrs. Macdonald, Flagg, T. C. Clarke, Fteley, Ostrom, C. J. Bates, Hardy, Emery, Brush, Bogart, North, Wegmann, James Owen, Worthen, Herschel, Shirreffs, H. Waller Brinckerhoff, and the author.

MARCH 18th, 1891.—The Society met at 20 o'clock, Vice-President Fteley in the chair; F. Collingwood, Secretary.

A paper by John Thomson, M. Am. Soc. C. E., on "Proportional Water-Meter, specially adapted to inferentially measure the total discharge of Nozzles," was read by the author. This paper and the paper on "The Nozzle as an Accurate Water Meter," by John R. Freeman, M. Am. Soc. C. E., were discussed by Messrs. Fteley, Trautwine, Professor J. E. Denton, Professor J. Burkitt Webb, Lewis H. Nash, John Thomson, North, and J. F. Holloway.

#### OF THE BOARD OF DIRECTION.

MARCH 5TH, 1891.—The duties of the Board under the new Constitution were discussed. The preparation of Forms, referred to in the Constitution, was referred to a Committee. The time and place of the Annual Convention were considered. It was decided that it be held at Lookout Mountain, Tenn., beginning about the 20th of May. Messrs. Whinery, Bogart and Shinn were appointed a Committee on arrangements.

The subject of the appointment of a Committee to represent the Society on the General Permanent Committee on International Congress and Engineering Headquarters in Chicago, was considered and action deferred.

It was ordered that after January 1st, 1891, the *Transactions* of the Society be furnished to all technical institutions at the regular rate, \$10 per annum, with a discount of 25 per cent., the same as to members.

The Secretary reported as to the issue of *Transactions* as second class matter, and that rates for postage in accordance therewith had been secured.

The Secretary announced that the recipients of the Rowland Prize had donated the sum of \$50 for the benefit of the Library, and that it had been applied on the purchase of the new Century Dictionary.

Applications for membership were considered. It was ordered that after considering the applications on the preliminary or blue list, for Associates, Juniors and Fellows, they shall lie over one month before a vote on admission will be taken. Appropriations were made for the month.



# American Society of Civil Engineers.

---

## CONSTITUTION.

ADOPTED MARCH 4TH, 1891.

---

### ARTICLE I.—NAME, LOCATION AND OBJECT.

1.—The name of this Association shall be THE AMERICAN SOCIETY OF CIVIL ENGINEERS.

2.—The offices of the Society shall be located in the City of New York.

3.—Its objects shall be the advancement of engineering knowledge and practice and the maintenance of a high professional standard among its members.

4.—Among the means to be employed for this purpose shall be: meetings for the presentation and discussion of appropriate papers and for social and professional intercourse; the publication of such papers and discussions as may be deemed expedient; the maintenance of a library, the collection of maps, drawings and models, and the establishment of facilities for their use.

### ARTICLE II.—MEMBERSHIP.

1.—The Corporate Members of this Society shall be designated as Members and Associate Members. There may also be connected with the Society, Honorary Members, Associates, Juniors, Fellows and Subscribers, who shall be entitled to all the privileges of the Society, except the right to vote and to hold office therein; provided that Honorary Members elected from the Corporate Members of the Society, shall retain their right to vote and to hold office.

2.—A Member shall be a Civil, Military, Naval, Mining, Mechanical, Electrical, or other professional Engineer, an Architect or a Marine Architect. He shall be at the time of admission to membership not less than thirty years of age, and shall have been in the active practice of his profession for ten years; he shall have had responsible charge of work for at least five years, and shall be qualified to design as well as to direct engineering works. Graduation from a school of engineering of recognized reputation shall be considered as equivalent to two years' active practice. The performance of the duties of a Professor of Engineering in a technical school of a high grade, shall be taken as an equivalent to an equal number of years of actual practice.

3.—An Associate Member shall be a professional Engineer or Architect not less than twenty-five years of age, who shall have been in the active practice of his profession for at least six years, and who shall have had responsible charge of work as principal or assistant for at least one year. Graduation from a school of engineering of recognized reputation shall be considered as equivalent to two years' active practice.

4.—Any person having the necessary qualifications prescribed in this article to entitle him to admission to the grade of Member or Associate Member, shall be eligible for such membership, though he may not be practicing his profession at the time of making his application.

5.—An Associate shall be a person, who, by scientific acquirements or practical experience, has attained a position in his special pursuit qualifying him to co-operate with engineers in the advancement of professional knowledge and practice, but who is not a professional engineer.

6.—A Junior shall be not less than eighteen years of age, and his connection with the Society shall cease when he becomes thirty years of age, unless he be previously transferred to another grade. He shall have had active practice in some branch of engineering for at least two years, or he shall have graduated from a school of engineering of recognized standing. He shall state in his application for membership that he intends to become or to continue to be an engineer. Persons who are in the Junior class at the time of the adoption of this Constitution shall not have their status changed by the provisions of this section.

7.—Honorary Members shall be chosen only from persons of acknowledged eminence in some branch of engineering or the sciences related thereto. There shall not be more than twenty at any one time.

8.—Fellows shall be contributors to the permanent funds of the Society, who may not be eligible for admission as Corporate Members.

9.—There may also be admitted to association with the Society as Subscribers, persons not less than twenty-one years of age who are not eligible for admission to any grade of membership otherwise provided for.

#### ARTICLE III.—ADMISSIONS AND EXPULSIONS.

1.—Honorary Members shall be proposed by at least ten Members, and shall be elected by a unanimous vote of the Board of Direction and such Past Presidents of the Society as shall be at the time Members and resident in North America. A Past President, or a member of the Board of Direction proposed for Honorary Membership, shall not be required to vote either for or against his own admission.

A person elected an Honorary Member shall be promptly notified thereof by letter. The election shall be canceled if an acceptance is not received within six months after the mailing of such notice.

2.—An application for admission to the Society as Member or as Associate Member, or for transfer from the lower to the higher grade, or for transfer from any other grade to either grade of Corporate Membership, shall embody a concise statement, with dates, of the candidate's professional training and experience; and shall be in a form and in such detail

as may be prescribed by the Board of Direction. It shall be signed by the applicant, and shall contain a promise to conform to the requirements of membership, if elected. The applicant shall give at least five references, who shall be Corporate Members in good standing, who shall each be requested by the Secretary to sign and forward a letter to the Board of Direction stating the extent of his knowledge of the applicant and of his qualifications, certifying that he knows the applicant personally and believes him to be in all respects a proper person to be admitted into the Society.

Applications of engineers not resident in North America, and who may be so situated as not to be personally known to five Corporate Members, may be recommended for ballot by members of the Board of Direction, after having secured evidence sufficient, in their opinion, to show that the applicant is worthy of admission.

3.—At stated periods, to be determined by the Board of Direction, there shall be issued to each member in any grade whose address is known, a list of all new applications received for membership in any grade or for transfer from one grade to another, which list shall be dated and shall contain a concise statement of the record of each applicant and the names of the references or endorsers, with a request that members transmit to the Board any information in their possession which may affect the disposition of the applications. Not less than twenty days after the issue of such list, the Board of Direction shall consider these applications, together with any information in regard to the applicants that may have been received; may make further inquiries, if deemed expedient; may classify the applicant with his consent, and on applications for Corporate Membership may direct a ballot.

4.—The ballots shall be letter-ballots, in a form to be prescribed by the Board of Direction. They shall be mailed to each Corporate Member whose address is known, and shall state the date on which the ballot is to be canvassed, which shall be not less than twenty days after the issue of the ballot. Seven or more negative votes shall exclude from election. In case of exclusion no notice thereof shall be entered on the minutes, but the candidate shall be notified.

5.—The Board of Direction, upon receipt of letters from not less than eight Corporate Members in good standing, requesting a reconsideration of the ballot on any excluded candidate and stating the reasons for such request, shall consider these reasons, and if the Board deems them sufficient, it shall cause a notice to be mailed to each Corporate Member whose address is known, giving the name and record of the applicant, and the names of those who ask a reconsideration. This notice shall include a request that any member having information which might aid in a proper consideration of the application, will at once transmit such information to the Board of Direction.

Not less than twenty days after the issue of this notice, the Board shall again consider the request with any additional information that may have been received, and it may continue the inquiry so as to secure the fullest information. If the Board decides that the reasons for a reconsideration are sufficient, it shall order another ballot to be taken. A letter-ballot in a form to be prescribed by the Board shall then be mailed to each Corporate Member whose address is known; and the vote thereon shall be canvassed at a meeting

held not less than twenty days after its issue. Negative ballots to the number of 10 per cent. of the votes cast shall exclude.

The request for reconsideration of a ballot must be presented within one year after the date of the original canvass of such ballot.

6.—An application for admission as Associate, Junior, Fellow, or Subscriber, shall be in a form to be prescribed by the Board of Direction; shall embody a statement of the applicant's qualifications for the grade of membership to which admission is sought and a promise to conform to its requirements. The application shall be signed by the applicant, and it shall be indorsed by at least three Corporate Members, who shall certify that they personally know the applicant, that they believe him to be in all respects a proper person to be admitted to the Society, and that they recommend him for admission.

7.—The Board of Direction, after making such inquiries as it may deem expedient, shall have the power to elect persons so proposed, as Associates, Juniors, Fellows, or Subscribers; and shall notify the membership of its action.

8.—All elected candidates shall be duly notified and shall subscribe to the Constitution and Rules of the Society. Forms for these purposes shall be prescribed by the Board of Direction. If these provisions are not complied with within six months from the notification of election, such election shall be considered void, unless for special reason the time shall be extended by the Board of Direction.

Membership of any person shall date from the day of his election.

9.—Upon the written request of ten or more Corporate Members, that for cause therein set forth, a person belonging to the Society be expelled, the Board of Direction shall consider the matter, and if there appears to be sufficient reason, shall advise the accused of the charges against him. He may, if he so desires, present a written defense which shall be considered at a meeting of the Board of Direction, of which he shall receive due notice. Not less than two months after such meeting, the Board of Direction shall finally consider the case, and if resignation has not been tendered, or a defense made which is satisfactory to the Board, it shall then notify the person that he will be expelled in one month, unless he elects to appeal from this decision. Appeals will be submitted to the Corporate Members by letter-ballot in a form to be prescribed by the Board of Direction. The ballot shall be accompanied by a statement of the charges, and of the action of the Board thereon, with such information as it deems proper, and also the statement of the person making the appeal. The ballot shall be canvassed by the Board not less than twenty days after its issue. A majority of the ballots cast will be required to sustain the action of the Board. The Board will notify the person and the Corporate Members of the result of the ballot. In case no appeal be made, the Board of Direction will expel the person, and notify him and the Corporate Members of its action.

10.—A member of any grade in the Society may resign his membership by a written communication to the Secretary, who shall present the same to the Board of Direction; when, if all his dues have been paid, his resignation shall be accepted.

11.—All persons elected and duly qualified, whose address on the records of the Society is within fifty miles of the Post Office in the City of New

York shall be deemed Resident, and those whose address is beyond that limit shall be deemed Non-Resident.

The classification of each person for the fiscal year as Resident or Non-Resident, shall be determined by the Records of the Society as they may appear on January 1st of that year.

#### ARTICLE IV.—DUES.

1.—The entrance fees payable on admission to the Society shall be as follows : by Members, thirty dollars ; Associate Members, twenty-five dollars ; Associates, twenty dollars ; Juniors, ten dollars ; Subscribers, ten dollars.

2.—The annual dues payable by members, whether Resident or Non-Resident, shall be as follows : by Corporate Members, fifteen dollars ; Associates, ten dollars ; Juniors, ten dollars ; and Subscribers, ten dollars.

3.—In addition to the dues prescribed in the preceding section, each resident member shall pay annually as follows : Corporate Members, ten dollars ; Associates, Juniors and Subscribers, five dollars.

4.—A person transferred from any grade to a higher one shall pay the difference between the entrance fees of the two grades, and his annual dues shall be those of the higher grade.

5.—The annual contributions shall become due for the ensuing year on the first day of January, and shall be payable in advance. It shall be the duty of the Secretary to notify each Member of the amount due for the ensuing year at the time of giving notice of the annual meeting.

6.—Persons elected after six months of any fiscal year shall have expired shall pay only one-half of the amount of dues for that fiscal year.

7.—All future annual dues may be compounded by a single payment by a Corporate Member of \$250; or by an Associate or Subscriber of \$150. Should a compounding Associate or Subscriber be elected to Corporate Membership he shall pay the further sum of \$100.

Provided, That all compounding Corporate Members, Associates or Subscribers who may be or hereafter become Resident, shall be and remain liable for the annual payment of the difference between the annual dues of Resident and Non-Resident Corporate Members, Associates or Subscribers ; but any Corporate Member may at any time compound for the future payment of all annual dues of every nature and kind by the payment of \$75 in addition to the \$250 hereinbefore named ; and any Associate or Subscriber may at any time compound for the future payment of all annual dues as Associate or Subscriber by the payment of \$40 in addition to the \$150 hereinbefore named.

Provided, that any person desiring to compound for future dues shall have paid his entrance fee, all arrears of dues, and the annual dues for the current year, before the compounding sum may be available.

Persons compounding shall sign an agreement that they will be governed by the Constitution and Laws of the Society as they are now formed, or as they may be hereafter altered, amended or enlarged ; and that in case of their ceasing to be connected with the Society from any cause whatever, the amount theretofore paid by them for compounding, and for entrance fees and annual dues, shall be the property of the Society.



All moneys thus paid in commutation of annual dues shall be invested as a permanent fund, only the interest thereupon being subject to appropriation for current expenses.

8.—Any person whose dues are more than three months in arrears shall be notified by the Secretary. Should his dues not be paid when they become six months in arrears he shall lose the right to vote or to receive the publications of the Society. Should his dues become nine months in arrears, he shall again be notified in form prescribed by the Board of Direction, and if such dues become one year in arrears, he shall forfeit his connection with the Society. The Board of Direction, however, may, for cause deemed by it sufficient, extend the time for payment and for the application of these penalties.

9.—The Board of Direction may, for sufficient cause, temporarily excuse from payment of annual dues any member who from ill-health, advanced age, or other good reason assigned, is unable to pay such dues; and the Board may remit the whole or part of dues in arrears, or accept, in lieu thereof, desirable additions to the Library, or collections.

10.—Every person admitted to the Society shall be considered as belonging thereto and liable for the payment of all dues until he shall have resigned, been expelled, or have been relieved therefrom by the Board of Direction.

11.—Persons elected as Fellows shall become such upon the payment of Two Hundred and Fifty dollars into the permanent funds of the Society. They shall not be liable for other fees and dues.

12.—The status of any present subscribers shall not be changed by the provisions of this Constitution.

#### ARTICLE V.—OFFICERS.

1.—The Officers of the Society shall be: A President, four Vice-Presidents, eighteen Directors, a Secretary, and a Treasurer; who, with all living Past Presidents of the Society who continue to be Members, shall constitute the Board of Direction, in which the government of the Society shall be vested, and who shall be the Trustees as provided for by the laws under which the Society is organized.

2.—The terms of office of the President, Secretary and Treasurer shall be one year; of the Vice-Presidents, two years; and of the Directors, three years. Provided, however, that at the first election after the adoption of this Constitution, four Vice-Presidents and eighteen Directors shall be elected, of whom two Vice-Presidents and six Directors shall be elected to serve for one year only, and six Directors for two years only; provided, also, that after the first election two Vice-Presidents and six Directors shall be elected each year.

The term of each officer shall begin at the close of the Annual Meeting at which such officer is elected, and shall continue for the period above named or until a successor is duly elected.

3.—A vacancy in the office of President shall be filled by the Senior Vice-President.

A vacancy in the office of Vice-President shall be filled by the senior Director. Seniority between persons holding similar offices shall be determined by priority of election to the office; and when these dates are the same, by priority of admission to Corporate Membership; and when the latter

dates are identical, the selection shall be made by lot. In case of the disability or neglect in the performance of his duty, of any officer of this Society, the Board of Direction shall have power to declare the office vacant. Vacancies in any office for the unexpired term shall be filled by the Board of Direction, except as provided above.

4.—The President shall be ineligible for re-election. The Vice-Presidents and Directors shall not be eligible for re-election to the same office, until at least one full term shall have elapsed after the end of their respective terms.

5.—At least one Vice-President, the Secretary and the Treasurer, and six Directors shall be Resident Corporate Members during their term of office.

#### ARTICLE VI.—MANAGEMENT.

1.—The President shall have a general supervision of the affairs of the Society. He shall preside at meetings of the Society and of the Board of Direction at which he may be present, and shall be *ex-officio* member of all committees. He shall deliver an address at the Annual Convention.

The Vice-Presidents in order of seniority shall preside at meetings in the absence of the President, and discharge his duties in case of a vacancy in the office.

2.—The Board of Direction shall manage the affairs of the Society in conformity to the laws under which the Society is organized and the provisions of this Constitution. It shall direct the investment and care of the funds of the Society; make appropriations for specific purposes; act upon applications for membership as heretofore provided; take measures to advance the interests of the Society; appoint all its employees; and generally direct its business. The Board of Direction shall make an annual report at the Annual Meeting, transmitting the report of the Treasurer and of other officers, and of Committees.

3.—The Treasurer shall receive all moneys and deposit the same in the name of the Society. He shall invest all funds not needed for current disbursements, as shall be ordered by the Board of Direction. He shall pay all bills, when certified and audited, as provided by this Constitution and by rules to be prescribed by the Board of Direction. He shall make an annual report and such other reports as may be prescribed by the Board of Direction. The accounts and financial books of the Society shall be examined annually by an expert accountant to be selected by the Board of Direction.

The Board of Direction shall secure a satisfactory surety for the faithful performance of his duties by the Treasurer, and shall renew the same during the month of January of each year.

4.—The Secretary shall be, under the direction of the President and Board of Direction, the executive officer of the Society.

He will be expected to attend all meetings of the Society and of the Board of Direction; prepare the business therefor, and duly record the proceedings thereof.

He shall see that all moneys due the Society are, carefully collected, and without loss transferred to the custody of the Treasurer.

He shall carefully scrutinize all expenditures, and use his best endeavor to secure economy in the administration of the Society.

He shall personally certify the accuracy of all bills or vouchers on which money is to be paid, and shall countersign the checks drawn by the Treasurer against the funds of the Society, when such drafts are known to him to be proper and duly authorized by the Board of Direction.

He shall conduct the correspondence of the Society and keep full records of the same.

He shall have charge of the Society's house and its contents ; shall supervise the work of all employés of the Society, and see that they diligently perform their respective duties.

He shall perform all other duties which may from time to time be assigned to him by the Board of Direction.

5.—An Assistant Secretary, who shall also be Librarian, shall be appointed by the Board of Direction and shall aid the Secretary and be under his immediate direction in all matters. His whole time shall be given to the Society.

6.—An Auditor shall also be appointed by the Board of Direction, who shall have entire charge of the books of account of the Society, and shall furnish monthly to the Board of Direction a statement of receipts and expenses under their several headings, and also a statement of monthly balances.

He shall present annually to the Board of Direction a balance sheet of his books, as of the 31st December, and shall furnish from time to time such other statements as may be required of him.

7.—The Secretary and Treasurer shall be paid salaries to be determined by the Board of Direction ; but such salaries shall not be reduced during the term of office, as provided in this Constitution. All other salaries shall be fixed, from time to time, by the Board of Direction.

8.—The Board of Direction shall meet within twenty days after the Annual Meeting, and shall then appoint from its members a Finance Committee of five, a Library Committee of five, and a Committee on Publications of five. At least three members of the Finance Committee, and two members of the other Committees, shall be resident within fifty miles of New York.

These Committees shall report to the Board of Direction, and perform their duties under its supervision.

9.—The Finance Committee shall have immediate supervision of the accounts and financial affairs of the Society, shall approve all bills before payment, and shall make recommendations to the Board of Direction as to the investment of moneys and as to other financial matters.

10.—The Library Committee shall have general supervision of the Library and the House of the Society and the property therein ; shall make recommendations to the Board with reference thereto, and shall direct the expenditure for books and other articles of permanent value, of such sums as may be appropriated for these purposes.

11.—The Committee on Publications shall have general supervision of the publications of the Society, and of contracts and expenditures connected therewith.

12.—In the consideration of papers offered for presentation, those papers containing matter readily found elsewhere, those specially advocating personal interests, those carelessly prepared or controverting established facts, and those purely speculative or foreign to the purposes of the Society, shall be

rejected. The Committee on Publications shall determine which papers shall be read in full, and which shall be printed after reading by title only. The Committee may return a paper to the writer for correction and emendation, and call to its aid one or more members of special experience relating to the subject treated, either to advise on the paper or to discuss it. Such papers as in the judgment of the Committee should appear in the *Transactions*, shall promptly, upon their acceptance, be printed and distributed to Members of all grades; others shall, with the consent of the authors, be suitably indexed and filed for reference, or the Committee may provide abstracts thereof, which, when approved by the authors, may be published instead of the original papers. Advance copies of papers and discussions may be sent out to the membership before final publication.

13.—Special committees to report upon engineering subjects shall be authorized only by a majority of the votes cast by the Society, and in the following manner: A proposition to appoint such a Committee shall be presented at a regular meeting of the Society, and if sustained, on a motion to refer the same to the Board of Direction, by an affirmative vote of not less than twenty-five Corporate Members, it shall be so referred.

The Board of Direction shall then consider the same and report its recommendations to the Society at the next general business meeting, together with a statement of the arguments for and against the appointment of such Committee.

If a motion for the issue of a letter-ballot thereon receive the affirmative vote of two-thirds of the Corporate Members present, the Board of Direction shall, within thirty days thereafter, issue the letter-ballot, accompanied by a statement of the arguments for and against the proposition.

A majority of a total vote of not less than one-third of the Corporate Membership of the Society shall be necessary for its adoption, whereupon the Committee so authorized shall be appointed by the Board of Direction.

#### ARTICLE VII.—NOMINATION AND ELECTION OF OFFICERS.

1.—At the Business Meeting of the Annual Convention, seven Corporate Members, not officers of the Society, shall be appointed by the meeting, who with the five last living Past Presidents of the Society shall be the Nominating Committee. This Committee shall present to the Board of Direction, on or before the first day of October ensuing, a list of nominations for the offices to be filled at the next Annual Election. These nominations shall be so made, as to provide, with the officers holding over, a Resident Vice-President and six Resident Directors.

Directly after the first of October this list shall be mailed to all Corporate Members of the Society; provided that if any person shall be found by the Board of Direction to be ineligible for the office for which he is nominated, or should a nominee decline such nomination, his name shall not be sent out, but the Board of Direction shall substitute another name therefor.

At any time previous to the first day of December any ten or more Corporate Members may send to the Secretary additional nominations, signed by such Members.



Should the nominations made not include a sufficient number of Resident Members to comply with the requirements of this Section, the Board of Direction shall add names of Resident Members sufficient to comply therewith.

At least thirty days previous to the Annual Meeting there shall be mailed to every Corporate Member whose address is known, a letter-ballot with envelopes for voting. This ballot shall include all the nominations made in accordance with this article. The names and residences of nominees and their grades of membership shall be given ; all the names for any one office being arranged alphabetically, and without distinguishing marks of any kind, except that the names of Residents and Non-Residents shall be in separate groups and shall be so designated.

Members voting may erase names from the printed ballot list, and may substitute the name or names of any other person or persons eligible for any office. But the number of names for each office on the ballot voted must not exceed the number to be elected at that time to such office, and the vote must be for the proper number of Resident and Non-Resident officers. Ballots not in accordance with these provisions must be rejected.

Directions in accordance with these provisions shall be issued with the ballots.

2.—Ballots may be sent by mail to the Secretary, or may be presented to him at the Society house. They may be enclosed in two sealed envelopes. The outer envelope shall be endorsed by the voter's signature.

The Secretary shall make from the endorsements on the outer envelopes a list of the voters from whom ballots are received, which list shall be open to inspection by all Corporate Members. A voter may change his vote by written request.

3.—The poll shall be closed at 12 o'clock noon on the first day of the Annual Meeting, and the ballots shall be canvassed publicly by tellers appointed by the presiding officer.

The persons voted for, for each office, Resident and Non-Resident, to the number of each class to be elected, who shall receive the highest number of votes, shall be declared elected.

In case of a tie between two or more candidates for the same office, the Annual Meeting shall elect the officer from among the candidates so tied.

The presiding officer shall announce to the meeting the names of the officers elected in accordance with this section.

#### ARTICLE VIII.—MEETINGS.

1.—A Convention of the Society for the reading and discussion of professional papers and for social intercourse shall be held annually at such time and place as the Society may determine.

2.—There shall be two general Business Meetings of the Society each year : the Annual Meeting, which shall be held at the offices of the Society on the third Wednesday in January, and at which the annual reports for the year ending December 31st previous shall be presented, and the ballot for officers canvassed ; and a Business Meeting during the Annual Convention, which shall be held at a time and place to be determined by the Board of Direction.



At these meetings thirty Corporate Members shall constitute a quorum.

3.—Business Meetings shall be held monthly on the first Wednesday of each month, except during the months of July and August. At these meetings thirty Corporate Members shall constitute a quorum.

4.—In addition to the Annual Meeting and the Annual Convention, meetings for the reading and discussion of papers shall be held as ordered by the Board of Direction.

5.—Special Meetings may be called by the Board of Direction, and *shall* be so called on the request of thirty Corporate Members, which request shall state the purpose of such meeting. The call for such meetings shall be issued ten days in advance, and shall state the purpose thereof, and no other business shall be taken up at such meeting. At these meetings thirty Corporate Members shall constitute a quorum.

6.—The Society may adopt, from time to time, rules for the order of business at its meetings.

7.—Meetings of the Board of Direction shall be held at the time of the Annual Meeting and of the Annual Convention, at which meetings nine Members shall constitute a quorum; and at such other times as the Board may determine, at which five Members shall constitute a quorum.

#### ARTICLE IX.—AMENDMENTS.

1.—Proposed amendments to this Constitution must be reduced to writing and signed by not less than five Corporate Members, and be submitted and acted upon as follows :

2.—Amendments presented to the Secretary on or before the first Wednesday in November shall be sent by letter to the several Corporate Members of the Society at least twenty-five days previous to the Annual Meeting. Such amendments shall be in order for discussion at such Annual Meeting, and may be amended in any manner pertinent to the original amendments by a majority vote of the Annual Meeting, and if so amended shall be voted upon by letter-ballot in form as amended by the Annual Meeting; if not so amended, they shall be voted upon by letter-ballot as submitted. The vote to be counted at the first regular meeting in March.

3.—Amendments presented to the Secretary not less than sixty days previous to the date of the Annual Convention, shall be sent by letter to the several Corporate Members of the Society at least twenty-five days previous to the Annual Convention. Said amendments shall be in order for discussion at the Business Meeting during such Annual Convention, and may be amended in any manner pertinent to the original amendments by a majority vote of the Business Meeting during the Annual Convention, and if so amended, shall be voted upon by letter-ballot in form as amended by said Business Meeting; if not so amended, they shall be voted upon by letter-ballot as submitted. The vote to be counted at the first regular meeting in October.

4.—If, after discussion of a proposed amendment, at either of the general meetings of the Society, the meeting shall so decide by a majority vote, it may refer the amendment to a Committee for further consideration, which Committee shall report at the next general meeting, whereupon the amendment shall be voted upon as hereinbefore provided.

5.—An affirmative vote of two-thirds of all ballots cast shall be necessary to the adoption of any amendment.

Amendments so adopted shall take effect thirty days after their adoption, provided that the officers of the Society, at the time any amendment may be adopted, shall continue in office until the next Annual Election.

---

## MEMOIRS OF DECEASED MEMBERS.

---

**FREDERICK MERCUR, M. Am. Soc. C. E.\***

---

DIED JANUARY 11TH, 1888.

---

Frederick Mercur was born in Towanda, Bradford County, Penn., Christmas Day, 1836. He was made a Member of this Society July 20th, 1870, and died January 11th, 1888.

His family were prominent in that section of the State, his father, Henry S. Mercur, was a coal operator with collieries at Pittston, Penn. One uncle was a leading business man in Towanda and another was a Judge of the Supreme Court of Pennsylvania.

He received his engineering education at the Troy Polytechnic Institute, and about 1854 entered one of the Engineer Corps under George B. Roberts, then engaged along the north branch of the Susquehanna in making surveys from Philadelphia to the lakes, *via* the Lehigh and Susquehanna Rivers. Although this ground has since been occupied by railroads, the North Pennsylvania Railroad, from Philadelphia to Bethlehem, is the only portion of the scheme built under the original organization.

Subsequently, he was engaged on a railroad in Georgia; was a Division Engineer on the location and construction of the Philadelphia and Erie Railroad, and did general engineering work in the oil regions of Pennsylvania. What is previously stated, is the recollection of various conversations with him. The writer's personal knowledge of him began when he came into the Lehigh Valley, about 1861. His professional career in the Lehigh region began with the Lehigh Valley Railroad Company, on the location and construction of what is now the Mahanoy Division, and with the exception of about one year, he was continuously with that company until his death.

He was a Division Engineer on the location and construction of the Penn Haven and White Haven Division, 1861-64, and also attended to the engineering work along the main line.

In 1863, as Principal Assistant Engineer to Robert H. Sayre, he made the location so well and widely known, down the Wyoming Mountain to

---

\* Committee to prepare Memoir, Mr. Calvin S. Brodhead, M. Am. Soc. C. E.

Wilkesbarre. On the completion of the Penn Haven and White Haven Railroad in the summer of 1864, he left the Lehigh Valley Railroad to take the position of Superintendent and Engineer of the Spring Mountain Coal Company, at Janesville, Penn. He held this position until the fall of 1865, when the Lehigh Valley Company began the construction of their line from White Haven to Wilkesbarre; when he returned, and, as Principal Assistant Engineer, had charge of this construction, 30 miles of heavy work, and the further extension up the north branch of the Susquehanna (the scene of his earlier labors), to a connection with the Erie Railroad at Waverly, a distance of 115 miles from Wilkesbarre.

The construction of the above 145 miles of road occupied from October, 1865, to about the same time in 1869. During the above time and until the summer of 1870, he was also variously engaged in the location and construction of branches and other work on the Lehigh Valley system.

He also, in 1867 and afterward, advised and assisted in the location and construction of the Buffalo Creek Railroad in the City of Buffalo, which forms part of the Lehigh Valley terminals in that city.

In the summer of 1870 he was made Superintendent and Engineer of the Lehigh Valley Coal Company, and supervised the development of its mining operations, then in their infancy, until his death, when they had attained a productive capacity of 2 000 000 tons per annum. In addition to the improvement and development of the many existing collieries acquired by purchase, he opened the Ontario, Exeter, Prospect, Oakwood, Packer, and Dorrance anthracite collieries, in Luzerne and Schuylkill counties.

Mr. Mercur was probably the first to change the practice of erecting a coal breaker over the mouth of a slope or shaft, as had previously been the custom, and which had such fatal results at Avondale that it is now forbidden by law. Having to deal with the most gaseous mines in the anthracite regions, his efficient arrangements for ventilation were such as to provide the maximum of safety and to be the admiration of his profession. About 1883 the Lehigh Valley Coal Company acquired a large bituminous coal property in the Snow Shoe district, the development and operation of which Mr. Mercur also directed. Whilst acting as Superintendent and Engineer of Mines, he was constantly consulted by the management of the Lehigh Valley Railroad in all important matters in civil engineering; and their extensive terminal system in Buffalo, known as the Tift Farm Improvement, was principally designed and constructed under his supervision.

As a mining engineer his opinion carried great weight in the anthracite regions, and it was frequently sought by his fellow engineers, and coal operators. As an engineer, whether civil or mining, he was in the first rank of natural ability. He had a singularly clear mind, and in the consideration of any subject he quickly grasped the salient, vital features,

and divested it of all extraneous matter. He was as clear and accurate in statement and illustration as in comprehension. Whilst not a student in its common acceptation, he kept himself well informed in the engineering literature of the day, and was always abreast of the times.

He was a close observer and reasoner, not only in matters connected with his profession but outside of it. Acquainted with theories because his mind sought the principles of things, he was eminently practical both in professional and business matters. He was an able executive, and had with it the rarer faculty of commanding, not only the hearty co-operation but the affection of his subordinates. Physically he possessed "the front of Jove—an eye like Mars, to threaten or command," and he was as noble in his mental traits as in his personal aspect—littleness had no abiding place in either.

His sense of personal honor was the highest and his honesty was unsullied. Conscious of his own merit and glad to have it recognized, his modesty never permitted its obtrusion. More egotism might have added to his fame although it might also have made him less lovable. Bacon says, "Vanity is to a man's fame like varnish to a ceiling, it causes it to both shine and last."

Possessing a reserve that was sometimes mistaken for hauteur, his constant mood to his friends was sunny and genial, and of strong social instincts, he enjoyed their society. Wit, humor, and pathos, went hand and hand with him, and no trait do I more vividly recall than his ardent sympathy and admiration for the brave deeds of the unknown toilers by land and sea.

He was not one of those who gather much of "this world's gear," a fact to which he often humorously alluded, whatsoever might have been his more hidden thought, but through life insurance he left his family a moderate competence; and such was the esteem in which he was held, that after his death some thousands of dollars were raised by his friends as a testimonial of his worth and their affection, which was applied to the education of his sons and the erection of an unpretentious monument.

He was stanch both in his friendships and dislikes, but of the latter he had few. He always sought pleasant social relations with his subordinates, and took especial pains to introduce them and bring them into notice, professionally and otherwise (a great benefit to a young man and one that I gratefully here set down). He was most happy in his domestic relations, and always spent with his family the time permitted by his professional engagements.

He had not been feeling quite himself for a month prior to his death, and the disease that carried him off—typhoid fever—was doubtless then germinating in his system. The immediate inciting cause was a cold, contracted whilst directing the operations of subduing a fire in one of his collieries. Neither his family nor his friends could realize that the

stalwart man was fatally stricken; and most of his acquaintances heard of his death, before learning of his sickness.

One day he took to his bed and that night he evidently knew, although others did not, that his hour had come. All the next day, and the next, he waited for the "King of Terrors" with solemn courage but with calm and cheer for his family, wisely advising his loving wife as to his designs and wishes for herself and her children, when at sunset he passed away, "Like one who wraps the drapery of his couch about him and lies down to pleasant dreams."

" Like the dew on the mountain,  
Like the foam on the river,  
Like the bubble on the fountain,  
Thou art gone and forever."

---

WILLIAM H. PAINE, Past Vice-President Am. Soc. C. E.

---

DIED DECEMBER 31ST, 1890.

---

Colonel William H. Paine, one of the most distinguished members of the engineering profession, whose name is indissolubly connected with the finest bridge structure ever built, was born at Chester, N. H., May 17th, 1828, of parents belonging to one of the oldest New England families, dating back to the *Mayflower*. His early education was such as could be gained from the schools of his native place, supplemented by an academic course. The natural bent of his mind led him to the choice of the profession of a clergyman as his life work, but after completing his education, in which he had given much attention to mathematical studies, circumstances prevented it, and he then resolved to become an engineer. He resumed his study of mathematics (teaching himself) with special reference to engineering, but was considerably interrupted by the removal of his family to Wisconsin.

In 1850, at the age of twenty-two, he began the practice of engineering in northern Wisconsin, being engaged principally in locating roads and in land surveying in a district where there were few white settlers. In 1852 he went overland to California, and was for a time employed by the late Colonel John Plumbe as his assistant, by whom he was introduced to a wide range of practice in mining, hydraulic, and topographical engineering. His abilities were especially shown there in connection with originating and operating new methods in mining engineering, by which the gold yields of the Pacific coast and the Rocky Mountain regions were greatly increased.



In 1853, in order to ascertain the length of what is known in the history of the Pacific Railroad, as the "Johnson route," he made a survey across the Nevada Mountains, from Sacramento to Utah. This, with other surveys across the plains made in the following years, added to his experience with the Indians, were of great value in scouting and kindred work, incident to his future army service. It was during this period that he brought into use the flat steel tape line and its accessories, in place of the link chain.

He returned to Wisconsin in 1856 and located at Sheboygan, where he became City Engineer, County Surveyor, and Engineer of the Sheboygan and Fond Du Lac Railroad.

At the beginning of the Civil War in 1861, he took an active part in the enlistment of volunteers, and several regiments were raised through his exertions. One of these was the "Fourth Wisconsin," which afterwards became famous for its efficiency and bravery. He accompanied this regiment to Washington just before the first battle of Bull Run. Many positions of command were offered him, in which the pay would be good, and chances of achieving fame great, but they were unconditionally declined, on the ground that he could render better service to the Government through his professional training, in the engineering department, than in a more active position in the field.

His first service in connection with the army was as civil assistant to General Whipple, Chief Topographical Engineer of the Army of Northeast Virginia. In this capacity he rendered invaluable service to the Government in obtaining information which it was deemed almost impossible to acquire.

After much effort he secured a chance to go, in civilian's dress, beyond the army lines, where there was imminent danger from the enemy's pickets; and with few assistants and insufficient equipments he made a thorough examination of the country, mapping it minutely, and learning, among other valuable facts, the location of all the bridges between Washington and Richmond that had been destroyed, as well as their respective lengths. This information was of vital importance to the Government, as no great army movements could be made until these bridges were repaired.

Although the employment of a civilian in the capacity of a military engineer was not recognized by the army regulations, the positions being held only by graduates of the Military Academy; when Colonel Paine's work was brought to the notice of President Lincoln, he determined to make use of Colonel Paine, and appointed him Captain of Engineers on the staff of the ranking major-general of the army.

His first regular assignment to duty was on the staff of General Irvin McDowell, commander of the Army of the Potomac; and he acted in a similar capacity on the staff of every successive commander, but one, of that army. His army record was a brilliant one, he having

served with distinction as a topographical engineer during the entire war; and, could it be written out, it would be of interest and historic value; but his modesty was so great, that it was with difficulty that his most intimate friends could gain anything from him, when his own genius and bravery were involved. His pure and lofty character and his genial nature made him many friends among the officers of the regular army, and prevented any barrier to pleasant official and personal intercourse, arising from the fact that he was not a graduate of West Point. In his whole army career he bore himself as a true Christian soldier and gentleman.

The accuracy and thoroughness of his topographical work are amply shown by the many maps made by him, now in the archives of the War Department. He worked with extreme rapidity and correctness, and the record of the time and money he spent in obtaining the notes and producing the maps, show an economy in cost, which is unparalleled.

After the close of the war, he resumed his profession, making Brooklyn, N. Y., his home. When General de Peyster, Horace Greeley and William Swinton were preparing their histories, he furnished most of the maps used by them, and gave much information of great value to the authors.

In 1867 he was appointed Chief Engineer of the Flushing and Northern Railroad on Long Island, and had charge of it until its completion.

Although Colonel Paine, through his long engineering career, was engaged in many important works, it was with the East River Bridge that his reputation as a constructing engineer was chiefly gained. He was engaged on that structure from the inauguration of the enterprise. For eighteen years he was identified with its interests, giving himself unreservedly to the difficult problems entrusted to him to solve, and always with success. Some of his most interesting work in this connection was that relating to the testing, tempering, and splicing, of the cable wires, and the adjustment of the wires and cables.

Although his professional life was one of great activity, which demanded constant and unremitting attention, Colonel Paine found time and opportunity to make himself familiar with other branches of science besides engineering. His acquaintance with chemistry, geology and the natural sciences, was wide and thorough; and his familiarity with general literature was that of a man of culture. He was also an inventor of no mean ability, fourteen patents for improvements connected with cable roads having been granted him between 1876 and 1889, and one on tunnel construction after his death.

Colonel Paine was elected a Member of the American Society of Civil Engineers May 12th, 1875; he was Director from November, 1876, to November, 1880, and Vice-President from January 12th, 1882, to January 21st, 1885.

He died December 21st, 1890, within a few months of completing his sixty-first year.

Colonel Paine was not only distinguished as a bridge constructor, but was also favorably known in other departments of engineering. In 1874 he was appointed Consulting Engineer on the Hudson River Tunnel, which he assisted in locating. He also assisted in preparing the plans for the prosecution of the work. His abilities in this direction were also brought into requisition in the work of constructing the tunnel under the Detroit River, at Port Huron, on which he was Consulting Engineer for some time.

The safety of the cables and anchorage of the Niagara Suspension Bridge having been brought into question, Colonel Paine was engaged, in 1877, to make an examination and report. His long experience upon the East River Bridge, eminently fitted him for this important work, and enabled him to apply the most thorough tests to all parts of the structure.

In cable railroad construction, Colonel Paine was also prominent, having been Consulting Engineer on the Tenth Avenue Cable Railroad, and the Constructing Engineer of the One Hundred and Twenty-fifth Street Line. He was also Consulting and Constructing Engineer on cable roads in Omaha, Kansas City, Denver and Cleveland. He was engaged in building the last named road, which was nearing its completion at the time of his death.

---

## LIST OF MEMBERS.

---

### ADDITIONS.

#### MEMBERS.

		Date of Election.
BENSEL, JOHN ANDERSON.....	64 East 79th St., New York }	J., Sept. 2, 1885
	City.....	M., Mar. 4, 1891
CUTSHAW, WILFRED EMORY.....	City Engineer, Richmond,	
	Va.....	March 4, 1891
FLYNN, PATRICK JOHN.....	Consulting Engineer, En-	
	gineer-in-charge of Con-	
	struction of the Inter-	
	cepting Sewer, 118 South	
	Hill st., Los Angeles, Cal.	Feb. 4, 1891
JUST, GEORGE ALEXANDER.....	90 Nassau st., New York }	J., Sept. 3, 1884
	City.....	M., Mar. 4, 1891
LUSE, JAMES LORING.....	Capt. Corps of Engineers,	
	U. S. A., Assistant to	
	Engineer Commissioner,	
	Washington, D. C.....	March 4, 1891

MARSHALL, HORACE MILLER.....	Vicksburg, Miss.....	Dec. 3, 1890
ORANGE, JAMES.....	Danby, Leigh and Orange, Hong Kong, China.....	Dec. 3, 1890
SMITH, GEORGE COLFAX.....	(Care G. W. Cronsie), 952 Goss st., Denver, Colo...	Dec. 3, 1890
TAYLOR, NORTON LONGSTRETH.....	514 California Building, Tacoma, Wash.....	Feb. 4, 1890

## JUNIORS.

DUSENBERRY, WALTER LORTON.....	358 Produce Exchange, New York City.....	Nov. 5, 1890
SELBY, OSCAR ELLSWORTH.....	Room 20, Kentucky National Bank Bldg., Louisville, Ky.....	March 4, 1891

## CHANGES AND CORRECTIONS.

## MEMBERS.

AIKEN, WILLIAM A.....	769 The Rookery, Chicago, Ill.
BLACKFORD, FRANCIS W., Jr.....	Box 781, Butte, Montana.
CLARKE, H. WADSWORTH.....	City Engineer, 1307 Genesee st., Syracuse, N. Y.
DRAKE, WILLIAM A.....	Jerome, Yavapai Co., Arizona.
DUN, JAMES.....	Chief Engineer Atchison, Topeka and Santa Fé R. R., Topeka, Kans.
GIBBS, CHARLES W.....	Chief Engineer Rio Grande Southern R. R., Ridgway, Colo.
HERRICK, HENRY A.....	Great Falls, Mont.
JAMIESON, J. Q.....	531 Hassalo st., East Portland, Ore.
JENNINGS, WILLIAM H.....	Engineer Maintenance of Way, Pittsburgh and Lake Erie R. R., Room 605, General office, Pittsburgh, Pa.
LA BARON, J. FRANCIS.....	6 and 7 Bostwick Building, Jacksonville, Fla.
NELLES, GEORGE T.....	McClintock Block, Room 6, Denver, Colo.
PETERSON, P. ALEX.....	Chief Engineer Canadian Pacific Ry., Mon- treal, Canada.
SYMINGTON, WILLIAM N.....	Brevard, Transylvania Co., N. C.
TITLOW, J. MILTON.....	Consulting Civil Engineer, Norristown, Pa.
UNTHANK, ACHILLES W.....	Yuma, Arizona.
WALTON, CHARLES W.....	419 Hammond Building, Detroit, Mich.
WHITFORD, OSCAR F.....	116 Johnson st., Syracuse, N. Y.
WRIGHT, AUGUSTINE W.....	503 Phenix Building, Chicago, Ill.

## JUNIORS.

DURYEA, EDWIN.....	Toleston, Lake Co., Indiana.
EARL, GEORGE G.....	P. O. Box 70, Americus, Ga.
FUERTES, JAMES H.....	Box 117, Camden, Ark.
HAWLEY, WILLIAM C.....	549 The Rookery, Chicago, Ill.
JOHNSON, SINCLAIR J.....	Phoenixville, Pa.
SEITZINGER, W. W.....	P. O. Box 768, Philadelphia, Pa.

## DEATHS.

BUEL, RICHARD H.....	Elected Member April 17th, 1872 ; date of death unknown.
LAWLER, JOHN.....	Elected Fellow April 28th, 1883; died February 23d, 1891.
MILLER, SAMUEL H.....	Elected Member September 6, 1882; died March 18, 1891.

## ADDITIONS TO LIBRARY AND MUSEUM.

- |   |  |
|---|--|
| <p>From Charles A. Allen, Worcester, Mass. :<br/>Annual Reports of the Committee on Sewers, the Superintendent of Sewers and the Chief Engineer, for the year ending November 30th, 1890.</p> <p>From American Institute of Mining Engineers :<br/>Electric Power Transmission in Mining Operations.<br/>Cast Iron Tools for Cutting Metals.<br/>Amalgamation at the Comstock Lode, Nevada.<br/>The Paint Ore Mines at Lehigh Gap.<br/>The Presentation of the Bessemer Medal.<br/>Interesting Vein-phenomena in Boulder Co., Col.<br/>Explosions from Unknown Causes.<br/>Analysis of Lake Superior Iron Ores.<br/>On Sulphur in Bessemer Steel.<br/>The Iron-breaker at Drifton, Pa.<br/>The Progress of German Practice in the Metallurgy of Iron and Steel since 1876.</p> <p>From Anderson &amp; Barr, Jersey City, N. J. :<br/>The Washington Bridge, Harlem River.</p> <p>From Association Amicale des Anciens Elèves de l'Ecole Centrale des Arts et Manufactures, Paris. Annuaire, 1832-1890.</p> <p>From Association of Engineering Societies :<br/>In Memoriam, Benjamin H. Greene.</p> <p>From Henry B. Baker, Secy. Michigan State Board of Health :<br/>Proceedings and Addresses at a Sanitary Convention held at Lapier, Mich., March 27th, 1890.<br/>Discussion of the Sewerage and Drainage of Ludington, Mich.<br/>The Sewerage of the City of Marquette, Mich.<br/>The Water Supply of Pontiac, Mich.<br/>The Water Supply of Owosso, Mich.</p> | <p>List of Publications of the Michigan State Board of Health.</p> <p>From Board of Railroad Commissioners, State of New York :<br/>8th Annual Report for the year ending June 30th, 1890.</p> <p>From Board of Railroad Commissioners, Massachusetts :<br/>22d Annual Report for the year ending January, 1891.</p> <p>From John M. Goodwin, Sharpsville, Pa. :<br/>Report Respecting the Feasibility of a Ship Canal to Connect the waters of Lake Erie and the Ohio River.</p> <p>From William H. Hall, State Engineer, San Francisco, Cal. :<br/>Irrigation, California. San Diego, San Bernardino, Los Angeles.</p> <p>From Norman W. Henley &amp; Co., N. Y. :<br/>Rubber Hand Stamps and the Manipulation of Rubber.</p> <p>From J. B. Henderson, Brisbane, Australia :<br/>Seventeen maps of Water Works Department.</p> <p>From A. W. Howitt, Secretary for Mines, Melbourne, Aus. :<br/>Reports and Statistics of the Mining Department for the quarter ending 30th September, 1890.</p> <p>From Institution of Civil Engineers, London :<br/>Timber in the Tropics.<br/>Railways and Collieries in North China.<br/>Siddnai Canal System.<br/>Conversion of Meter Gauge to Indian Standard Gauge.<br/>Carrara Marble District Railway.<br/>Flow of Water in Earthen Channels.<br/>Vibratory Movements of Locomotives.<br/>Gas Supply of Buenos Ayres.</p> |
|---|--|



- Rao Shri Pragmalji Bridge.  
Indian Bridges.  
Mental Calculation. A reminiscence of the late G. P. Bidder, Past President.  
Tramway Permanent Way.  
Abstract of Papers in Foreign Transactions.  
Steam on Common Roads.
- From William Jackson, City Engineer, Boston, Mass.:  
24th Annual Report for the year 1890.
- From Königlichen Technischen Hochschule zu Aachen:  
Die Gewerbliche Arbeit.
- From G. Leverich, Brooklyn, N. Y.:  
Report of the Board of Experts, New York and Brooklyn Bridge.
- From Massachusetts Harbor and Land Commissioners:  
Annual Report for the year 1890.
- From John McGee, Buenos Ayres:  
Tables of Area of Triangles.
- From Mexican Society of Engineers, Mexico:  
El Puerto de Veracruz. Memoria escrita para la Asociacion de Ingenieros y Arquitectos de Mexico.
- From Major J. C. Post, U. S. Legation, London:  
Fourth International Congress on Inland Navigation at Manchester, Eng.
- From T. A. Randall & Co., Indianapolis, Ind.:  
Durability of Brick Pavements.
- From Clifford Richardson:  
Report of the Inspector of Asphalt and Cements of the District of Columbia. Characteristics of Well and Spring Water in a thickly populated area.
- From Scientific Publishing Company:  
Wedding's Basic Bessemer Process. The Metallurgy of Steel.
- From J. Herbert Shedd, City Engineer, Providence, R. I.:  
Contracts and Specifications for building Sewers, Providence Water Works. Thirty-four blue prints of Providence Public Works.
- From Smithsonian Institution, Washington, D. C.:  
Annual Report of the Board of Regents, to July, 1888.
- From Société des Ingénieurs Civils, Paris:  
Annuaire de 1891.
- From U. S. Department of State:  
Reports from the Consuls of the United States, No. 123, December, 1890.
- From Christopher Sower Company, Philadelphia.:  
Plane and Solid Geometry.
- From U. S. Department of the Interior:  
Mineral Products of the United States, 1882 to 1887.
- From U. S. Navy Department:  
Pilot Chart of the North Atlantic Ocean. March, 1891.  
Annual Register of the U. S. Naval Academy. 1890-91.
- From U. S. Treasury Department, Bureau of Statistics:  
Commerce and Navigation of the United States, 1890.
- From U. S. War Department, Chief of Engineers:  
Reports of the examination of Rivers and Harbors, as follows: Black River, S. C.; Chickahominy, River, Va.; Corsica Shoal, Mich.; Devil's Lake, North Dakota; Mokelumne River, Cal.; Nandua Creek, Va.; Pease River, Fla.; St. Augustine, Fla.; St. John's River, Fla.; Sacramento and Feather Rivers, Cal.; Washington Harbor, Pamlico River, N. C.; Wateree River, S. C.  
Report upon the work of constructing a canal and locks at the Cascades of the Columbia River.  
Report in relation to the occupancy of a portion of the iron piers at Lewes, Del.  
Report upon the advisability of re-opening Willow Slough from the Mississippi River to Quincey Bay.  
Report on the construction of the building for the Library of Congress.  
Report why the Washington and Great Falls Electro-Railway Company should not be allowed to lay its track on the Conduit Road.
- From J. H. Woodbury, Boston, Mass.:  
Conflagrations in Cities.  
Boston Manufacturers' Mutual Fire Insurance Company. Circulars and Mill Drawings.

# American Society of Civil Engineers.

---

## PROCEEDINGS.

---

Vol. XVII.—April, 1891.

---

## MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

---

### OF THE SOCIETY.

APRIL 1ST, 1891.—The Society met at 20 o'clock, Past President William E. Worthen, in the chair; F. Collingwood, Secretary. Ballots were canvassed, and the following candidates declared elected: As Members: Job Abbott, New York City; Francis Clarke Gamble, Victoria, B. C.; Charles Alfred Wilson, Toledo, Ohio. As Associate Members: William Frederick Jordan, Rochester, N. Y.; Levis Passmore Pennypacker, New York City; Clement Isaac Walker, New York City.

The following resolution was adopted, and referred to the Board of Direction:

*Resolved*, That the Library of the Society shall be opened, lighted and warmed during every evening except Sunday, extending through the season occupied by the regular meetings of the Society.

The Secretary announced that at the meeting of the Board of Direction, March 31st, 1891, the following candidates were elected. As Associates: Silas Gildersleeve Comfort, Chester, Pa.; James Randall Dunn, New York City; William Churchill Oastler, New York City. As Juniors: William Ethelred Belknap, Jersey City, N. J.; Eduardo Justo Chibas, Pittsburgh, Pa.; Lawrence Bates Jenckes, South Manchester, Conn.; John Charles Lewis Rogge, New York City; Pemberton Smith, Jersey

City, N. J.; Arthur Hastings Wood, National City, Cal. As Fellow: Edward Dean Adams, New York City.

A paper by J. Foster Crowell, M. Am. Soc. C. E., on "Characteristics of the Ravine du Sud, in the Island of Hayti, and plan for averting its overflow," was read by the author.

A paper by William E. Worthen, Past President Am. Soc. C. E., on "A Description of the Concrete Sewer at Mount Vernon, N. Y.," was read by the author and discussed by Messrs. Brush, Flagg, Collingwood, R. L. Harris, Odell, Crowell, James Owen, Morison, Hardy and Seaman.

APRIL 15TH, 1891.—The Society met at 20 o'clock; Director Edward P. North in the chair; F. Collingwood, Secretary.

A paper by A. McL. Hawks, Jun. Am. Soc. C. E., on "The Colorado Automatic Refrigerator System at Denver, Colo.," was read by the Secretary, and discussed by Messrs. Haskins, H. W. Brinckerhoff, J. T. Ford, Collingwood, Morison, North, and John Thomson.

A paper by Carroll Ph. Bassett, M. Am. Soc. C. E., on "Inland Sewage Disposal, with Special Reference to the Work at East Orange, N. J.," was read by the author, and discussed by Mr. Hering. The paper was illustrated by the stereopticon.

## OF THE BOARD OF DIRECTION.

MARCH 31ST, 1891.—The Constitution was discussed. The Treasurer presented a list of members in arrears. Forms required by the Constitution were considered, amended, and approved. Messrs. D. J. Whittemore and William P. Shinn, Past Presidents Am. Soc. C. E., were appointed delegates to represent the Society on the General Permanent Committee on International Congress and Engineering Headquarters in Chicago. Applications were considered. Appropriations were made for second quarter of 1891.

## LIST OF MEMBERS.

### ADDITIONS.

#### MEMBERS.

		Date of Election.
ABBOTT, JOB.....	150 Broadway, New York City.....	April 1, 1891
DILLMAN, GEORGE LINCOLN.....	Union Pacific Ry., Portland, Ore .....	March 4, 1891
GAMBLE, FRANCIS CLARKE.....	Victoria, B. C.....	April 1, 1891

## MEMBERS.

		Date of Election.
HILLS, FRANCIS LOWELL .....	Chief Engineer Wilmington and Northern R. R., Wilmington, Del.....	March 4, 1891
WILSON, CHARLES ALFRED.....	Chief Engineer Wheeling and Lake Erie R. R., Toledo, Ohio .....	April 1, 1891

## ASSOCIATE MEMBERS.

JORDAN, WILLIAM F.....	Assistant Chief Engineer Buffalo, Rochester and Pittsburgh R. R., Rochester, N. Y.....	April 1, 1891
PENNYPACKER, LEVIS PASSMORE...	113 West 38th st., New York City.....	April 1, 1891
WALKER, CLEMENT ISAAC.....	113 West 38th st., New York City.....	April 1, 1891

## ASSOCIATES.

COMFORT, SILAS GILDERSLEEVE....	Pennsylvania Military Academy, Chester, Pa.....	March 31, 1891
DUNN, JAMES RANDALL.....	40 Wall st., New York City..	March 31, 1891
OASTLER, WILLIAM CHURCHILL....	43 Exchange place, New York City.....	March 31, 1891

## JUNIORS.

BELKNAP, WILLIAM ETHELRED....	Pennsylvania R. R., Jersey City, N. J.....	March 31, 1891
JENCKES, LAWRENCE BATES.....	South Manchester, Conn...	March 31, 1891
ST. JOHN, RICHARD COLLIER.....	Princeton, N. J.....	Oct. 1, 1890
VIELÉ, MAURICE AUGUSTUS.....	324 St. Nicholas ave., New York City.....	Feb. 4, 1891

## FELLOW.

ADAMS, EDWARD DEAN.....	455 Madison ave., New York City.....	March 31, 1891
-------------------------	--------------------------------------	----------------

## CHANGES AND CORRECTIONS.

BLACKWELL, CHARLES.....	Herron ave., Pittsburgh, Pa.	
BREITHAUP, WILLIAM H.....	92 Times Building, New York City.	
BRIGGS, ROSWELL E.....	1439 William st., Denver, Colo.	
BROWNE, GEORGE H.....	Gen. Man. Philadelphia Co., 820 Penn ave., Pittsburgh, Pa.	

- CONNETT, ALBERT N.....Division Engineer Broadway Cable Construction Co., 113 West 38th st., New York City.
- DRAKE, WILLIAM A.....Pueblo, Colo.
- EVANS, GEORGE E.....87 Wilder st., Lowell, Mass.
- FELTON, SAMUEL M.....80 Broadway, New York City.
- HUGHES, WILLIAM M.....1143 The Rookery, Chicago, Ill.
- JONES, WASHINGTON.....1632 North 15th st., Philadelphia, Pa.
- KASTL, ALEXANDER E.....Chillicothe, Peoria Co., Ill.
- KELLEY, WILLIAM D., JR.....(Care W. D. Kelley), Kelley's Island, Erie Co., Ohio.
- MILLER, SILVANUS.....Livingston, Guatemala, Central America, *via* New Orleans.
- PRATT, WILLIAM A.....Division Engineer Maintenance of Way, B. & O. R. R., Pittsburgh, Pa.
- REA, SAMUEL.....Box 198, Pittsburgh, Pa.
- ROSEWATER, ANDREW.....424 Bee Bldg., Omaha, Neb.
- SAABYE, OSCAR.....12 Moomair Bldg., Roanoke, Va.
- SCOVILL, E. TRACY... ..(Care Union Club), Cleveland, Ohio.
- VANCE, HART.....(Vance & Mahlo), Central Block, Middlesborough, Ky.

## JUNIORS.

- ADAMS, JULIUS L.....Adams Engineering Co., Gate City Bank, Atlanta, Ga.
- CONNOR, E. H.....21 Cortlandt st., New York City.
- ERLANDSEN, OSCAR.....Mt. Carmel, Northumberland Co., Pa.
- FERGUSON, WILLIAM L.....1632 North 15th st., Philadelphia, Pa.
- GAHAGAN, WALTER H.....(Care St. L., A. & T. Ry.), Pine Bluff, Ark.
- GOSLING, EDGAR B.....3 rue des Mathurins, Paris, France.
- KIMBALL, GEORGE A.....Exchange Bldg., Boston, Mass.

## DEATH.

- HILGARD, JULIUS E.....Elected Member July 10th, 1872; died May 8th, 1891.

---

## ADDITIONS TO LIBRARY AND MUSEUM.

---

From American Institute of Mining Engineers:

British Contributions to the Metallurgy of Iron and Steel.  
International Standards for the Analysis of Iron and Steel.  
Latest Developments in Compressed Air-Motors for Tramways.  
Notes on the Excavation of the New Croton Aqueduct.

Notes on the Progress of Mining in China.

On the Probable Future of the Manufacture of Iron.  
On Welding by Electricity.  
Progress in Magnetic Concentration of Iron Ore.  
The Copper Resources of the United States.  
The Development of the Marine Engine.



- and the Progress made in Marine Engineering during the past fifteen years.  
 The Genesis of the Edgar Thompson Blast Furnaces.  
 The Geology of the Haile Mine, South Carolina.  
 The Protection of Iron and Steel Ships against Foundering from Injury to the Shells.  
 The Thies Process of Treating Low-Grade Auriferous Sulphates at the Haile Gold Mine, South Carolina.  
 The Wear of Metal as Influenced by its Chemical and Physical Properties.
- From American Society of Microscopists :  
 General Index to the Proceedings, 1878-90.
- From Boston Public Library :  
 Annual Report for 1890.  
 Bulletin for April, 1891.
- From O. M. Carter, Capt. Corps of Engineers :  
 Report of the Examination and Survey of the Savannah River above Augusta.
- From Canadian Society of Civil Engineers :  
 Transactions, October to December, 1890.
- From Committee on Street Cleaning, N. Y. :  
 An Examination of the Subject of Street Cleaning in the City of New York.
- From Bolton W. De Courcey, Portland, Oregon :  
 Twenty-six Photographs of Port Angeles and the Scenery of the Olympics.
- From Harbor Commissioners, Montreal, Canada :  
 Annual Report for 1890.
- From Rudolph Hering, N. Y. :  
 Reports on the Sewerage and Water Supply of Atlanta, Ga., Disposal of Sewage.
- From Institution of Civil Engineers, London :  
 Minutes of Proceedings, Vol. CIII.
- From H. C. Johnston, Selina, Kansas :  
 Gregorian and Mohammedan Calendars.
- From E. D. Leavitt, Cambridgeport, Mass. :  
 Report of a Test of the Steam Plant of the Washington Mills, Lawrence, Mass.
- From the Mayor of Montreal :  
 Annual Reports for 1889.
- From Mining Institute of Scotland :  
 Transactions, Vol. XII., 1890-91.  
 Index to Vols. I.-XII.
- From Geo. S. Morison, Chicago, Ill. :  
 The Sioux City Bridge.
- From Oahu Railway and Land Co. :  
 Second Annual Report for the year ending December 31st, 1890.
- From Ernest Pontzen, Paris :  
 Procédés Généraux de Construction. Travaux de Terrassement, Tunnels, Dragages et Dérochements.
- From John C. Post, Legation of the U. S., London :  
 Returns made to the Board of Trade in respect of the Canals and Navigation in the United Kingdom for the year 1888.
- From Publisher's Weekly, N. Y. :  
 Co-operative Index to Periodicals, 1890.
- From Lt. Col. R. A. Sargeant :  
 Administration Report on the Railways in India for 1889-90.
- From Secretary for Mines, Melbourne, Australia :  
 Reports and Statistics of the Mining Department for the quarter ending December 31st, 1890.
- From J. Herbert Shedd, Providence, R. I. :  
 Annual Report of the City Engineer for 1890.
- From Frederic P. Stearns, Boston, Mass. :  
 Examinations by the State Board of Health on the Water Supplies and Inland Waters of Massachusetts, 1887-90.
- From M. Alfred Tresca, Paris :  
 Congrès International de Mécanique Appliquée, tenu à Paris du 16 à 21 Septembre, 1889.
- From Trustees of the Newberry Library, Chicago, Ill. :  
 Proceedings for the year ending January 5th, 1891.
- From U. S. Department of Agriculture :  
 Album of Agricultural Statistics of the United States.
- From the U. S. Department of State :  
 Reports from the Consuls of the United States, January, 1891.  
 Olive Culture in the Alpes Maritimes.
- From the U. S. Navy Department :  
 Pilot Chart of the North Atlantic Ocean, April, 1891.  
 Washington Observations, 1885.
- From U. S. Patent Office :  
 Alphabetical Lists of Patentees and Inventors for the quarter ending September 30th, 1890.  
 Index to Official Gazette.
- From U. S. War Department—Chief of Engineers :  
 Specifications as follows :  
 For dredging bar at Saginaw River, Mich.  
 For dredging in James River, Va.  
 For dredging at Taunton River, Mass.  
 For dredging harbor at Thunder Bay, Mich.  
 For dredging in Charlotte Harbor, Fla.  
 For dredging in Darien Harbor, Ga.  
 For dredging in Tampa Bay, Fla.  
 For dredging in Oswego Harbor, N. Y.  
 For dredging in Manistee Harbor, Mich.  
 For construction of rip-rap jetties at Patchogue River, Long Island, N. Y.  
 For construction of breakwater at Duck Island, Conn.  
 For delivery of stone at Sandy Hook, N. J.  
 For building timber dyke in the Shrewsbury River, N. J.  
 For furnishing material and labor at Fort Wayne, Mich.  
 For furnishing stone for canal basin, Louisville and Portland Canal.  
 For improvement of Rappahannock River, Va.  
 For improvement of Philadelphia Harbor.  
 For improvement of harbor at Saline Pass, Texas.  
 For improvement of Elk River, Md.  
 For improvement of Passaic and Elizabeth Rivers, N. J.  
 For improvement of entrance to Galveston Harbor, Texas.  
 For improvement of North East River, Md.  
 For improvement of Fairlee Creek, Md.

For removal of the wreck *Bruce*, Harbor of Ship Island.  
 For furnishing stone for dam at Grand Rapids, Mich.  
 For furnishing timber for St. Mary's River, Mich.  
 For building dwelling house in Yellowstone National Park.  
 For building pile and brush dam in San Joaquin River, Cal.  
 Report of examination of Bayou Teche, La.  
 Report of examination of Bayou Vermilion, La.  
 Report of examination of harbor at Hudson, Wis.  
 Report of examination of Trinity River, Texas.  
 Report of examination of Weymouth Back River, Mass.  
 Report of the mining debris question of California.  
 Testimony taken by the Committee on

Levees and Improvements of the Mississippi River.  
 From U. S. War Department—Ordnance Office:  
 Notes on the construction of Ordnance No. 56.  
 From University of the State of New York: State Library Bulletin, February, 1891:  
 From J. Elfreth Watkins, Washington, D. C.: Report on the Section of Transportation and Engineering in the U. S. National Museum, 1888.  
 From Edmund B. Weston, Providence, R. I.: Appendix to the Annual Report of the Chief Engineer of the City of Providence for the year 1890.  
 From C. J. H. Woodbury, Boston, Mass.: Report of Committee on Sanitation of the School Committee of the City of Lynn, for the year 1890.

# American Society of Civil Engineers.

---

## PROCEEDINGS.

---

Vol. XVII.—May, 1891.

---

### MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

---

#### OF THE SOCIETY.

MAY 6TH, 1891.—The Society met at 20 o'clock, President O. Chanute in the chair; F. Collingwood, Secretary. Ballots were canvassed and the following candidates declared elected: As Members: William Albert Allen, Portland, Me. ; Edward Burr, Cascade Locks, Ore. ; George Dowman Fitz Hugh, Birmingham, Ala. ; Charles Webster Gay, Lynn, Mass. ; Robert Giles, Topeka, Kans. ; Howard Hill Jackman, Wichita, Kans. ; Andrew Dempster Whitton, Philadelphia, Pa. As Associate Members: Frederick Christian Holberg Arentz, St. Louis, Mo. ; William Ashburner Cattell, Long Island City, N. Y. ; Harry Frease, Cleveland, O. ; Thomas Henry Grant, Red Bank, N. J. ; William Dean Janney, Ceredo, W. Va. ; Richard Lamb, Norfolk, Va. ; Fred Morley, Ann Arbor, Mich. ; Theodore Starrett, Chicago, Ill. ; Edmund Coffin Stout, New York City; George Copeland Urquhart, Steubenville, O. ; Sigmund von Gemmingen, Richmond, Va. ; Edwin Hall Warner, Seattle, Wash.

The Secretary announced that at the meeting of the Board of Direction, May 5th, 1891, the following candidates were elected: As Associate: Harry Comer, Jersey City, N. J. As Juniors: James Berrall, Biltmore, N. C. ; Edward Thomas McConnell, Indianapolis, Ind. ; James Clark McGuire, Phoenixville, Pa. ; William C. Tucker, New York City; Frank Walker Wilson, Cleveland, O.

A paper by Julien A. Hall, M. Am. Soc. C. E., on "Right of Way for Railroads," was read by the Secretary, and discussed by Messrs. R.

L. Harris, Brendlinger, Charles J. Bates, Brush, Crowell, Odell, North, Emery and F. W. Watkins.

BUSINESS MEETING HELD DURING THE ANNUAL CONVENTION OF THE SOCIETY,  
HELD AT LOOKOUT MOUNTAIN, TENN., MAY 21ST-25TH, 1891.

THURSDAY MORNING, MAY 21ST, 1891.—A preliminary business meeting was held at the opening session of the Convention, O. Chanute, President Am. Soc. C. E., in the chair; F. Collingwood, Secretary.

The Secretary announced the purpose of the meeting to be to consider the best method of appointing the Nominating Committee as required by the Constitution.

Mr. C. B. BRUSH moved that a Committee of three, consisting of the President, Past President Shinn and the Secretary, be appointed to prepare and report a plan to the regular business meeting of the Society to be held on Saturday.

Mr. G. BOUSCAREN moved to amend by making the Committee consist of five members, to be appointed by the President, and to include those already named. This was adopted.

The President announced the Committee, as follows: The President, the Secretary, and Messrs. Shinn, Brush and Bouscaren.

The business meeting then adjourned to Saturday, at 10 A.M.

SATURDAY, MAY 23D, MORNING SESSION.—(Business meeting during the Convention.) O. Chanute, President Am. Soc. C. E., in the chair; F. Collingwood, Secretary.

The PRESIDENT.—We are now met as a business meeting of the Society and I will call for the reading of the report of the committee appointed on Thursday to devise a method for the appointment of the Nominating Committee.

The SECRETARY read the provisions of the Constitution calling for the appointment of such a committee and called attention to its importance on account of the large number of officers to be elected at the next annual meeting.

Mr. SHINN then read the report as follows:

*To the American Society of Civil Engineers :*

Your Committee, to whom was referred the subject of the appointment of a Nominating Committee, would respectfully report:

Article VII, Section 1 of the Constitution, provides that at the business meeting of the Convention seven corporate members, not officers of the Society, shall be appointed at the meeting, who, with the five last living Past Presidents of the Society, shall be the Nominating Committee. Each Convention, therefore, in its own way, must determine how the Nominating Committee for the current year shall be appointed.

We recommend that this Convention divide the corporate membership into seven districts, as shown in the table annexed to this report, and that the corporate members from each district shall present the names of three corporate members in that district, from which the Convention shall select one member of the Nominating Committee.

Twenty-one names will thus be before the Convention. We recommend that these names be posted in the meeting room of the Convention, after which an opportunity shall be offered to every corporate member present at the Convention to cast a written ballot for one member from each district to compose the Nominating Committee. The member from each district receiving the largest number of votes shall be declared the member of the Nominating Committee for that district.

In case of a tie the President shall cast the deciding vote.

In case there shall be no names presented for any district or not a sufficient number of names, the President shall select and present names for that district to the Society.

Respectfully submitted,

O. CHANUTE,  
WILLIAM P. SHINN,  
CHARLES B. BRUSH,  
G. BOUSCAREN,  
F. COLLINGWOOD,  
*Committee.*

#### PROPOSED DISTRICTS FROM WHICH TO SELECT THE NOMINATING COMMITTEE.

No. 1. New York City and 50 miles around.

No. 2. Canada and other nations—New York State outside of District No. 1; New Jersey and Delaware.

No. 3. Maine, New Hampshire, Vermont, Massachusetts, Connecticut and Rhode Island.

No. 4. Pennsylvania and Maryland, and the District of Columbia.

No. 5. Michigan, Ohio, Indiana, Illinois, Wisconsin.

No. 6. Minnesota, Iowa, Missouri, Kansas, Nebraska, North and South Dakota, Montana, Wyoming, Colorado, Utah, Idaho, Washington, Oregon, Nevada, California.

No. 7. Virginia, West Virginia, North and South Carolina, Georgia, Alabama, Mississippi, Louisiana, Florida, Texas, Tennessee, Kentucky, Indian Territory, New Mexico, Arizona, Arkansas.

Mr. SHINN.—I will state that the Committee which drew up the amendments to the Constitution which you have adopted so nearly unanimously, purposely avoided making any provision as to how this Nominating Committee should be appointed, leaving that entirely in the hands of each Convention of the Society to decide for itself. If the plan adopted by this Convention shall prove to have worked satisfactorily the next Convention probably will adopt the same plan, and that plan will be continued until there is an apparent reason for a change, but it will be wholly within the power of any future Convention to adopt any change it may see proper.

The PRESIDENT.—Gentlemen, you have heard the report of the Committee, what will you do with it?

A MEMBER.—I move it be adopted. (Seconded.)

Mr. SHINN.—Before further discussion upon that, Mr. President, I



will explain one or two points in regard to the plan presented by the Committee. In the first place, it was thought wise by the Committee to continue the district system of representation on the Nominating Committee, as has been done for some years past under the old By-Law. The former By-Laws, and more recently the Constitution, provided for a Nominating Committee composed of five members; and at the first Convention at which that Nominating Committee was elected, the country was districted into five districts, and a member was selected from each district by the membership from that district present at the Convention. That plan has been followed from year to year, without change, up to this time. The Committee on Constitution changed the number from five to seven, and left it entirely in the control of the Convention as to whether those seven should represent separately a distinct district, or whether they should be chosen as a whole from the whole membership.

Your Committee, whose report I have just read, thought it wise to try a continuation of the district system, and therefore have adopted a division into districts which was presented to the Committee on Constitution by a meeting of the Cincinnati members some two years ago. We took that because it was handy, and also because the division seemed to be reasonably fair. But your Committee made a radical change in the method of selecting the member from a district. Originally the members present from each district have made the selection of their member from that district. It has been apparent, that in some cases this selection was determined by two or three men representing the different districts, and in that sense the Nominating Committee was, to a certain degree, packed. In order to prevent the possibility of that, and as the Nominating Committee represents the whole Society, and not merely the districts, it was thought wise by your Committee to have the membership of each district select three names, and from those names the Convention should select one to represent that district. The only desire of the Committee in adopting this plan, was to give to each section of the country an opportunity to be fully and properly represented, and also that the membership as a whole should be fairly and properly represented.

Mr. EDWARD P. NORTH.—There are a great many advantages, if extremely uncertain action, in the continuation of a "*status quo*;" there are also disadvantages. I object to this report, which is explained by Past President Shinn, in that it seems to be intended to prevent any expression of dissatisfaction by a district with the management of the Society. I do not see that there is any necessity of controlling the delegation, whether the member of the Nominating Committee comes from Maine or from California; and I think that the members of a district who are present in the Convention ought to be allowed to elect their members, without reference to the wishes of the rest of the Society. If there is one particular man that they wish to put in, they should be

allowed to do it. They all have an opportunity to be represented here, and I think it is rather gratuitous to suppose that the nominations would be packed.

I would like to move an amendment to that report, that instead of the nominations being voted for by the Society, the nomination of the delegates from any district shall be equivalent to an election by the district from which they are nominated. (Seconded.)

A MEMBER.—There is one point about that: the Committee propose that three names shall be nominated by each district; it would be necessary to eliminate two of these and have only one name suggested by each district.

A MEMBER.—Can that motion be stated again?

The PRESIDENT.—The motion is to amend the report of the Committee by substituting a clause under which each district can nominate but one member of the Nominating Committee, that nomination to be equivalent to an election. Are there any remarks?

Mr. ROBERT MOORE.—Mr. President, the plan proposed by the Committee meets my hearty approval; I should vote against the amendment proposed. It seems to me that the method proposed gives each district a fair chance to express its opinion by selecting the three members, all of whom, if the representation from that district choose, may be members who shall vote against the present administration, or shall vote for it, if that is their wish. In other words, this ticket as fairly expresses the wishes of that division as can any single one. I think further that the whole Society has as deep an interest in the constitution of that Committee as has any member of it or any subdivision of it; and that it is only right that they should have a voice in the choice, the particular expression of their views on the part of a subdivision being given in the three names from which the choice must be made. Besides this amendment seems to me of rather questionable legality. The Constitution says: "At the business meeting of the Annual Convention seven corporate members, not officers of the Society, shall be appointed by the meeting." The proposed amendment is equivalent to saying that the members of the Nominating Committee shall be appointed by sub-committees from each division, and that the meeting shall have no voice in it. It seems to me a clear violation of the spirit, if not of the letter of the Constitution. I hope the amendment will not prevail.

Mr. WILLIAM METCALF.—I hope the amendment to the report will prevail. It seems to me that the proposition to nominate one person from each district is at least carrying out the old practice of the Society. This plan of presenting three names adds a complication very decidedly to the election, and furthermore makes it very much easier in case anybody does want to set up a ticket for any particular purpose, to do it, than if one person alone were named. It is a good deal easier to slip in a specially desired name in one of three and then fix things up to vote for

that name, than when there is only one. It is better to just take one person from each district where the members from each district can have a good chance to know whom they are voting for.

It seems to me a much better way to make these nominations would be, to have a blank ballot sent out by the Secretary before the Convention, to each district, blank ballots containing the names of the members living in that district, and let the ballots come into this meeting from each separate district, and then the person receiving the highest number of votes from that district would be the member of the Nominating Committee; that would give Members of the Society a chance to vote on the Nominating Committee. I cannot see what is to be gained to the Society by this complication of naming three people to be voted on again here by the general meeting. Besides, as a rule, persons from one of the eastern districts, for instance, will not know the members and who they are voting for from a district in the south.

I hope the amendment will prevail. Whether it is strictly according to the letter of the Consitution or not, it is in accord with the spirit of what we have always done.

Mr. SHINN.—I suppose I might say on behalf of the Committee that I think Mr. Metcalf is mistaken in the opinion that it will be easier to "set up" a Nominating Committee by the plan proposed by our Committee than on the old plan. In the first place, the party desiring to set it up would have to agree upon all of the three members from each district so that any one of them that might be elected would still be within the charmed circle. In the next place, it would be necessary to see a majority of the whole Convention in order to be sure of electing any one out of that three to represent that district.

The plan that Mr. Metcalf suggests as being more desirable could only be adopted by a change in the Constitution. Of course that is not under consideration at the present time, and I understand Mr. Metcalf is merely suggesting that method as a preference, but I fully believe that the plan reported by the Committee will give satisfaction. I do not think the Committee feel any anxiety upon the subject and will be satisfied with whatever the Convention adopts. I do not think the members of the Committee will feel at all hurt if their suggestions are not adopted, but I do believe that it will be worth while for this Convention to give that plan a trial. Therefore, I hope this amendment of Mr. North's will not prevail.

Mr. FREDERICK BROOKS.—It seems to me the better way would be to have the amendment not prevail and have it understood that for the arrangement of the three names from each district, the Secretary shall arrange the names in order of first choice and that name should be reported by the Convention.

Mr. NORTH.—My amendment was merely made with the intention of giving the best opportunity for any person or any section of the Society

that was dissatisfied with the management, to be heard. If you notice, there are seven districts, and five Past Presidents besides the member from each district representing them; that makes twelve altogether; the influence of any one member would be an influence of between 8 and 9 per cent. of the Nominating Committee. I do not think that even the most conservative man among us would object to such conservatism as that. I think it might prevent a little dissatisfaction.

Mr. F. W. SKINNER.—I hope Mr. North's amendment will not prevail. I think that the recommendations of the Committee are very desirable, and there is one point in them which I do not understand to have been elicited by the discussion. I think that it is in the spirit of the Committee's recommendations that the proposed Nominating Committee shall be essentially selected by the local committees, but that the American Society of Civil Engineers as a whole, in Convention assembled here, shall have the privilege of voting upon them. The caucus provides three candidates and the Convention cannot go outside of those three candidates, but it can have choice of those three. Ordinarily the preferred candidate would head the list and his chances of election would be in large proportion greater than those of the succeeding ones, but in case of any packed caucus the members at large would have an opportunity to see it.

Mr. Metcalf's suggestion of preliminary ballots I think commendable but might require particular action upon the Constitution to carry it out; if it could be effected, I think it would be a very excellent method for the future.

Mr. HENRY GOLDMARK.—I would like to second what Mr. Skinner has just said. I think it is a question of some little importance whether the Members of the Society who are not able to attend the Convention should not have a somewhat greater voice in the selection of the Nominating Committee than they have had in the past. In the election of members, the practice has always been observed of having all members vote upon every candidate; that of course is constitutionally proper, and it is to be hoped that some changes may finally be made so that those members in each district who are able, may meet and exchange opinions upon the question at issue, the nomination of this Committee. I think some such scheme should be devised by which the members in different sections of the country may confer beforehand and agree pretty well among themselves who shall have the nomination from that district. In the large district from which I come, we have a very small attendance of members here; and it seems to me that for two or three or perhaps a half dozen members to take upon themselves the responsibility of suggesting the one-seventh of the Committee, is a pretty serious one. I know that to be away from this Convention and hear, perhaps several months afterwards, who the man is who was selected, detracts somewhat from the interest and feeling of satisfaction with which members look upon the



matter. In the selection of officers for Harvard University, a system of letting the alumni suggest these names a month or so beforehand has proved very successful. I do not know that their system could be introduced, but I would like to ask how it could best be done.

Mr. SHINN.—There would have to be some other constitution.

Mr. CHARLES B. BRUSH.—I hope Mr. North's amendment will not prevail. We are here simply as the whole Society. The main object is to advance the welfare of the Society and advance the individual membership to the highest degree possible. We have certain responsibilities thrown upon us by the Constitution; I, for one, am ready to meet every responsibility. I don't want to delegate my responsibility to any one. Those suggestions will carry with them practically the force of a settlement of the question in each district, unless the Society at large see some reason to change, and why it should seek to throw aside some of the responsibility that naturally comes upon it I don't understand. I think that we have done everything desirable by recommending these nominations to come in the way proposed; but that we should delegate that responsibility to a few members from some special districts, I think is a mistake. At one time in our experience there was only one member from one district, that member happened to be for a short time, a resident of the district, but knew nothing of the necessities of the district. We are come together here to talk together and see what the necessities of the different districts are. I want to feel perfectly free, in case a member from the seventh or the sixth, or any district desires and can present reasons why a certain member should be on the Committee, to throw my whole influence in favor of that man. I believe always in meeting my responsibilities and I hope the report of the Committee will be accepted.

Mr. JAMES B. FRANCIS.—I have no doubt the Committee have carefully considered this matter and I think we had better give it a trial; I understand it is merely for this year. I certainly think the Committee have had a better opportunity of considering the matter than any single member, and I should hope their recommendations would be adopted.

Mr. METCALF.—I do not see that, under the Constitution, it would require the slightest change in the Constitution if this Convention choose to order that hereafter the Secretary should send out blank ballots to all the Members of the Society, requesting them to return them with a certain number of persons marked on the ballot, sending along with the ballot a list of the members in that district, then let the Convention decide and take out of the suggestions the highest three or highest two and vote for them, thus covering the same ground exactly that the Committee is trying to reach. It will give the whole Society an opportunity to express its views or wishes in regard to the officers of the Society; it will much better reach the general expression of opinion than this plan of the Committee. Take Mr. Brush's illustration, let there be one man



here from one district, he simply names three men after all, and the Convention have only his choice. You do not add anything to the strength of the Nominating Committee by this plan. Although I have never had anything to do with the setting up of any committee in the Society, yet if I wanted to do it I would like to have this plan to work on.

The PRESIDENT.—The question is on the amendment proposed by Mr. North to the report of the Committee, that but one name shall be nominated for a member of the Nominating Committee for each district. Decided in the negative by a rising vote of 31 to 33.

The question now comes up on the adoption of the report of the Committee. The report was adopted.

The next business in order will be to receive nominations from the various districts, and if any of the districts have already, in anticipation, taken action, they will please hand the names they have selected to the Secretary.

Mr. SHINN.—I suggest that you call upon the districts in order.

The President read the list of districts.

Mr. STEVENSON TOWLE.—On behalf of the first district I propose the names of Messrs. P. F. Brendlinger, C. C. Martin, James Owen.

Mr. S. WHINERY.—The report of this Committee has just been adopted. As I understand it, a number of districts have not had an opportunity to confer and agree upon the names. To ask for a nomination immediately is taking rather a snap judgment, and the result will not be satisfactory. I therefore move that an adjourned business meeting be held on Monday morning, at 9.30 A.M., to receive these nominations and act upon them. I do not see how the different districts can be expected to present names at such short notice.

The SECRETARY.—Would you not name 3 o'clock this afternoon?

Mr. ROBERT MOORE.—A large number are going away; an adjournment of the business meeting to Monday is equivalent to ruling us out. I think if the call of the various districts is made it will be found that most of them have made their selections.

A MEMBER.—I suggest this afternoon at 3 o'clock.

Mr. BRUSH.—Before the motion is put—I am speaking on the motion—the announcement was made last night that this would be the report of the Committee, and a request was made that the members from the different districts should meet and unite, as far as possible, in relation to the names to be proposed. In response to that request several districts have met. I would like to second the suggestion made by Mr. Moore, that those districts which have met and agreed upon nominations should at this time present those nominations. It may be possible for the other districts to agree upon their nominations later on in this morning's session. This afternoon quite a number have arranged to go in different directions and visit different parts of the neighborhood. If possible, it is better to have it settled during this morning, when we

have so large an attendance. If most of the districts have prepared their names, at twelve or half-past twelve it might be possible to conclude this business.

Mr. SHINN.—I suggest that Mr. Whinery withdraw his motion until the call of the districts has been completed, and we ascertain which are and which are not prepared.

Mr. WHINERY.—Certainly; I was not aware that this suggestion was made last night, and half of those around me were not aware of it.

The PRESIDENT.—The motion being withdrawn, I will call upon the second district; is the second district ready to report?

Mr. METCALF.—If it be in order to offer a resolution.

The PRESIDENT.—No, sir; not until we complete the call of the districts.

A MEMBER.—Is it in order to ask that those sections which have not selected their names be allowed a recess of fifteen minutes to complete their nominations,

The PRESIDENT.—Let us complete the call first. (Called for the third district.)

Mr. FRANCIS.—District No. 3 has selected Messrs. Henry Manley, J. W. Bacon, J. Herbert Shedd.

The PRESIDENT.—District No. 4.

Mr. SHINN.—I am authorized to report on behalf of District No. 4, the following names: Messrs. William Metcalf, of Pennsylvania; Frederick H. Smith, of Maryland; Bernard H. Green, of the District of Columbia.

Mr. METCALF.—Mr. President, as an illustration of the way this thing works, I never heard that that district had had a meeting at all.

Mr. SHINN.—Mr. President, I will say that the members from that district diligently sought Mr. Metcalf for half an hour without success, and concluded finally that the only way was to nominate him, at all events he would be satisfied with the result.

The PRESIDENT.—District No. 5.

Mr. ROBERT L. READ.—I understand that the members from our district have not had a meeting and we will withdraw, with your permission, and send up a report later.

The PRESIDENT.—Permission will be granted. District No. 6.

Mr. MOORE.—On behalf of the members here from District No. 6, I beg to present the names of Messrs. W. S. Lincoln, of St. Louis; Robert B. Stanton, of Denver; James B. Schuyler, of San Diego.

Mr. T. GUILFORD SMITH.—May the members from our district withdraw to agree upon their nominations?

The PRESIDENT.—Permission is granted.

The SECRETARY.—Would it not be well for the Convention, immediately upon the close of this call, to take a recess for whatever time the Convention may decide in order to allow reports to be made from districts not then reported ?

The PRESIDENT.—The Chair will announce that after the call a recess of fifteen minutes will be taken, but in the meantime the members of any district who may wish to confer with each other may withdraw. Is District No. 7 ready?

Mr. G. B. NICHOLSON.—No, sir; we had a caucus but we did not know we had to adopt names.

Mr. BRUSH.—I move that the second and seventh districts be allowed to withdraw, the same as the fifth, and make their nominations. Carried.

(Recess taken.)

The PRESIDENT.—We will now complete the call of the various districts. District No. 2 reported the names of George S. Field, P. A. Peterson and R. H. Thurston. District No. 7 reported the names of O. H. Landreth, E. T. D. Myers and George B. Nicholson. The second has reported, and so has the seventh; is the fifth district ready to report?

Mr. GEORGE S. MORISON.—The fifth district has agreed upon the names, the report will be handed in in a moment.

Mr. BRUSH.—The President, when the names from the fifth district are presented I move that we meet to receive the ballot. In order to save time, I move that the Secretary distribute the slips through the room while we are waiting.

Mr. SHINN.—It will probably be necessary to take a recess of five minutes to enable the members to select the names from the black-board.

The PRESIDENT.—It will be so ordered.

The Secretary read the nominations from the fifth district as follows: W. E. Merrill, C. L. Strobel, C. E. Greene.

The PRESIDENT.—A recess of five minutes will now be taken to enable the gentlemen to prepare their ballots. (Recess taken.)

Mr. SHINN.—Gentlemen, you will bear in mind that your ballots will contain but one name from each district.

Mr. L. L. BUCK.—Any one who is elected on the Nominating Committee of course cannot serve as an officer of the Society, consequently, if anybody here prefers to have some of his friends chosen for any office he had better not nominate them for the Nominating Committee.

The PRESIDENT.—I would also add that each member should endorse his name upon the back of his ballot. The Constitution limits the right of voting to corporate members.

Mr. MORISON.—I think that is not the proper method of proceeding. I think we should be free with our votes. I think we may rely on the honor of the gentlemen present not to vote unless they are entitled to do so.

The PRESIDENT.—The Chair will decide that point to be well taken.

Mr. SHINN.—Mr. President, I do not think that, under the Constitu-

tion, we have any right to rely on anybody's honor. The Constitution is very clear that only corporate members shall vote. It is well known that at the last Convention a number of persons voted who were not corporate members. Now, it is the duty of this Convention to know that the members voting are corporate members; whatever means they may take is within their power, but they have no right to rely upon anybody's honor.

Prof. O. H. LANDRETH.—Does not the Constitution say that when the names are endorsed the Society shall furnish blank envelopes in which the ballot is enclosed? I think there may be gentlemen who prefer not to have their names known, and if the names are to be required blank envelopes should be employed, such as is required by the Constitution in balloting for members.

Mr. MORISON.—I will move that this Convention now assembled trusts to the honor of its members not to vote unless they are entitled to.

Mr. BRUSH.—I would suggest that the ballot be taken by the Secretary, or the clerk, who knows all the members, and if any member does not choose to put his name on a ticket he need not do so. That settles the question without bringing up the personal part.

The PRESIDENT.—Mr. Brush suggests that the ballots be collected by the clerk of the Society who knows all the members and who are entitled to vote, thus obviating any necessity of the voter putting his name on the back of his ballot; is that accepted?

Mr. MORISON.—I am willing to withdraw the motion provided it is distinctly understood that there is no doubt but that the members present are going to vote in an honorable way, but I do not want any police regulations; all I want to express is that we believe in our own members.

The PRESIDENT.—The Chair will appoint as tellers Mr. Bouscaren, Mr. Moore and Mr. Goldmark.

Mr. METCALF.—Is a resolution in order now?

The PRESIDENT.—A resolution would be in order.

Mr. METCALF.—I offer the following resolution: That at least thirty days before the next Annual Convention the Secretary issue a blank ballot, endorsed "Nominating Committee," to all members of the Society, by districts, as adopted at this Convention. Upon opening the ballots at the next Convention that Convention is requested to elect from each district one of the names presented, and it is recommended that the ballots be limited to the three names having the highest number of votes.

Mr. BRUSH.—I rise to second that motion, which I do most heartily. It is exactly in the line of my thought, it gives the opportunity for the full membership in each district to fully express its views, and that is the only object that any of us have, that each district shall have an opportunity to state its views, as they should have. By this means they would be enabled to form a proper judgment as to who should be on the

Nominating Committee for the succeeding year. This is a recommendation for the next Convention. This Convention cannot bind the next, but it can recommend certain action to it; and if it seems to be desirable, undoubtedly the next Convention will take such action.

Mr. NORTH.—I think Mr. Metcalf's resolution will probably meet the views of all the members present. I merely wish to call attention to the peculiarity of the arguments used here to-day. All of them commenced with the assertion that they are in the line of the speaker's thoughts, and closed with a personal appeal in favor of or against the motion. Now, I think a motion before this Society should stand on its intrinsic merits, not on the line of preference of the speaker advocating it.

Mr. BRUSH.—I do not see how any speaker can possibly express any other views than his own views; these are valuable simply as they are received by the Convention as being in order, wise or proper. I presume Mr. North in presenting his views has presented what he thought the best view. I certainly do not want to present what somebody else thinks, when I speak, I speak what I think.

The PRESIDENT.—If there are no further remarks the question will be put.

A MEMBER.—Will the Chair read the resolution?

The President read the resolution as above.

Mr. SHINN.—The point that arises in my mind in regard to the resolution is this: the Society has committed the management of its affairs to a Board of Direction; now we ought to be careful how we take the management of the Society out of the hands of the Board of Direction and put it into the hands of conventions. The practice at conventions heretofore at which I have been present, when it was desired to take any action looking to a point beyond the existing convention, was for the Convention to recommend to the Board of Direction that it do thus and so. I would like to see this resolution take that form. This Convention has a perfect right to take any proper action looking to its own doings, action which does not extend beyond the Convention; but it seems to me to be at least lacking in courtesy to the Board of Direction to take action which looks to the control of future conventions and the movement of the Society, entirely beyond the scope of the time occupied by this Convention. I would therefore move that the pending resolution be worded so as to provide that this Convention requests the Board of Direction to take such action as will result in what is there proposed.

The PRESIDENT.—Is that accepted?

Mr. METCALF.—No, sir; I do not accept that, not from any want of courtesy to the Board of Direction; I am a firm believer in the propriety of referring all executive matters to the executive officers of an organization, and the less work that a large body like this does, the better. In this case the Constitution directs the Convention to appoint a Nominating Committee; the Board of Direction have nothing to do with



that. This is merely representing that certain data having been presented, we recommend to the next convention that they appoint their Nominating Committee next year in a certain way. If the Convention see fit to adopt that way of making the Nominating Committee and it should prove to work satisfactorily, it would be a very right and proper thing in subsequent years to make this the constitutional mode of conducting this election. In the Constitution we have no directions at all, except that the Convention should do this thing. I certainly do not want to offer any resolution that would look to the change of the Constitution until we have had some time to test it thoroughly. I do not see why we should bother with discourtesy to the Board of Direction. Why the Board of Direction should be requested to interfere in this case, I fail to see.

MR. SHINN.—I differ with my friend, Mr. Metcalf, in regard both to what this resolution orders done and as to how it shall be done. Mr. Metcalf states that this resolution merely requests the next convention to do something. I think that is not the fact. It does not merely do that, but it directs the Secretary of the Society to do something. Now the Secretary of the Society is under the orders of the Board of Direction, and thus orders to the Secretary of the Society ought to pass through the Board of Direction. That is the point I make. It is a matter of courtesy, a matter of right, and I hope—I am not on the Board of Direction and it is in no way a personal matter to me—but I hope this Convention will not take such action as to establish a precedent hereafter by which future conventions may be directing the Secretary to do this, that and the other thing which is not provided for in the Constitution, both as a matter of courtesy to the Board of Direction and as a matter of right in regard to directing the Secretary. If this Convention express its wishes to the Board of Direction I know they will be binding. It is not so much the action of this particular convention as it is the precedent that it furnishes for the future.

MR. J. M. KNAP.—The present Secretary is the Secretary not only of the Board of Direction, but of the Convention, certainly the Secretary that the last election approved.

MR. NORTH.—Mr. President, I would like, in view of the able remarks of Mr. Shinn, to bring before this Society a question of some considerable importance, it is this: whether the Board of Direction are the servants of the American Society of Civil Engineers, or the rulers. I take it that the Board of Direction of any elective body are the servants of that body; and while possibly every man here will agree that a meeting of the American Society of Civil Engineers, not called for the purpose of deliberation, are not competent to give directions to the Board of Direction, that a Convention of the Society or their annual meeting, is at any time competent to give to the Board Direction any orders that they please, so that it does not interfere with the Constitution of the

Society. It will appear to every one here that that is a point worth considering. Mr. Metcalf's resolution did not bring that out but Mr. Shinn has kindly brought it out, and here at this meeting where the representation is more general than any we have had for a long time, it might be decided which of the views we shall take. One or the other must be adopted at some time and possibly should govern the Society, whether the Board of Direction shall do exactly as they please, or shall do as the Society pleases them to do.

Mr. BRUSH.—The question that has been raised by Mr. North is a very vital one. I have been connected with the Boards of Direction for a number of years, and with the Society for a number of years longer. I have never heard of any requests or suggestions of conventions that have ever been disregarded by, or not carried out by the Boards of Direction, which are the servants of the Society. The suggestions of Mr. Shinn are exactly in the line of Mr. North's, that having an executive body, if any action is to be taken, if any money is to be expended—as money will have to be expended in this case—it should be done through regular channels. Therefore, if I understand Mr. North's suggestions, it is that he seconds Mr. Shinn's amendment.

Mr. NORTH.—You are probably individual in your understanding.

Mr. BRUSH.—I think, in connection with the amendment, it is simply carrying out the views of all who have spoken on the subject, and I hope it will prevail; it is intended to more thoroughly carry out the ideas presented in the original resolution. I cannot see any objection to the original mover accepting the amendment, for all directions will have to be given by the Board of Direction before the Secretary can act, if he is to act, both as to expenditures and method of proceeding, which renders it very important that the matter should go through the regular channels. If you feel that it is necessary to go that far and direct or command the Directors, do so; it seems to be hardly necessary. Certainly action of this kind can be done with more regularity by going through regular channels.

Mr. SHINN.—Mr. President, I think as Mr. North has said, this is an important question. It is important, not merely with reference to the pending motion, but with reference to the policy which it adopts for the government of this Society. Now the Constitution under which we are operating has been pretty carefully drawn. It provides in Article V, Section 1, after stating who shall be the officers of the Society, that they "shall constitute the Board of Direction in which the government of the Society shall be vested, and who shall be the Trustees." Now Trustees elected in any legally constituted body, as this is—this Society is a corporation of the State of New York—are responsible agents. The law provides that its Trustees shall manage its affairs, subject to the limitations of the Constitution and By-Laws, if it has any, provided the Constitution and By-Laws do not disagree with

the Laws of the State of New York. Now, as Mr. Brush has pointed out, the action which this resolution provides for and directs to be had, involves expenditure of money. This Constitution expressly declares how money shall be expended. It is not a question as to whether the Board of Direction are the masters or servants of the Society; that is not the question. The Board of Direction are Trustees acting under the responsibility which is imposed by the laws of the State under which they are elected, and they are bound, both materially and legally, to conform to those laws and to the Constitution and to their obligations. As Mr. Brush has said, this matter cannot go through without being acted upon by the Board of Direction. (Read from Article VI, Section 4.) Now, before the Secretary has got authority to obey the mandate of this Convention, after it adjourns—I will admit to-day he is under its direction and control—but after this Convention adjourns he has got to have the sanction, the authority, the order of the Board of Direction. Now, it is not courteous, it is not respectful, it is not legal, for this Convention to order the Secretary to do thus and so and ignore the Board of Direction. As Mr. Brush has said, it has been the custom of the Society for years, whenever the Society desired any action to be taken, to request that Board of Direction to take that action. I have never known the Board of Direction to disregard that request. But this Convention might pass a resolution asking something which might be detrimental to the Society. The Board of Direction cannot be coerced in regard to these matters which come under its authority. A Trustee cannot be dictated to as to what he shall do, except by the terms of his trust. This is not a question of personal feeling; it is an important question as to the policy to be adopted and as to the precedent that we establish at the Convention in regard to any future action by the Society.

The PRESIDENT.—The question is upon the substitution of the words “Board of Direction” for the word “Secretary” in the resolution.

Mr. SHINN.—My motion goes a little further: that the Board of Direction be requested to issue a blank ballot, not directed but requested.

Mr. T. GUILFORD SMITH.—Was that amendment of Mr. Shinn’s seconded?

A MEMBER.—I second Mr. Shinn’s amendment.

Mr. NORTH.—Will you please read the resolution as it stands.

The PRESIDENT.—*Resolved*, That at least thirty days before the next annual convention the Board of Direction be requested—

Mr. SHINN.—I would change the wording there to say “the Board of Direction” be requested to issue at least thirty days before the next annual convention.

The PRESIDENT.—*Resolved*, That the Board of Direction be requested to issue, at least thirty days before the next Annual Convention, a blank ballot, endorsed Nominating Committee, to all Members of the Society,

by districts, as adopted at this Convention. Upon opening the ballots at the next Convention that Convention is requested to elect from each district one of the names presented, and it is recommended that the ballots be limited to three names having the highest number of votes.

Mr. NORTH.—I would like to move the amendment, “the Board of Direction shall issue.”

Mr. METCALF.—Could all these objections be met in this way: the Secretary to issue the ballot, under the orders of the Board of Direction?

Mr. NORTH.—I do not want to appear here in factitious opposition to the friends of mine in this Society, but I wish to say to you and I believe Mr. Shinn will agree with me, that whenever there is a swindling Board of Direction they are invariably the trustees of the property they are robbing. It is impossible that there should be any such board in the American Society of Civil Engineers, so it is not a matter of immediate application in the affairs of the Society; but I object thoroughly from the experience that I have had, to the assumption that any Board of Trustees, elected trustees, I do not mean those appointed by the Court, that they are bigger than the power that creates them. I think wherever there is a swindle it is upon this assumption. I do not believe it is possible that any such case should occur in this Society; it is a mere matter of principle with me and not of immediate application. It is for this reason that I propose this last amendment, that the Board of Direction shall do it; I think that is proper.

Mr. METCALF.—The suggestion I have made covers Mr. North's idea exactly, but it does not come in the form of an order from the Convention to the Board of Direction, we just pass a resolution that the Secretary shall issue the ballot under the orders of the Board.

Mr. SHINN.—I would like to ask Mr. Metcalf what would happen if the Board did not give the order.

Mr. METCALF.—Then the ballot would not go out.

The PRESIDENT.—Does the Chair understand Mr. North to offer his amendment as a substitute for Mr. Shinn's?

Mr. NORTH.—I did, and now I accept Mr. Metcalf's suggestion. The only thing I want to bring before the Convention is the principle.

The PRESIDENT.—Does Mr. Shinn accept Mr. Metcalf's suggestion?

Mr. SHINN.—I do not.

The PRESIDENT.—In that case the question would come up upon the substitute as offered by Mr. Shinn.

Mr. NORTH.—The amendment of Mr. Metcalf.

The PRESIDENT.—The question will come up as to the amendment of Mr. Metcalf to the amendment proposed by Mr. Shinn. (Seconded.) (Vote put.)

The PRESIDENT.—It is carried.

Are you now ready for the question upon the resolution as amended?



A MEMBER.—Will the Chairman please repeat the resolution as amended?

Mr. Metcalf re-wrote his resolution, which the Chair read as follows:

*Resolved*, That at least thirty days before the next Annual Convention, the Secretary shall issue, under the orders of the Board of Direction, a blank ballot, endorsed "Nominating Committee," to all Members of the Society, by districts, as adopted at this Convention. Upon opening the ballot at the next Convention that Convention is requested to elect from each district one of the names presented from that district, and it is recommended that the ballots be limited to the three names having the highest number of votes in each district.

Mr. SHINN.—Mr. President, in order to disembarass the question of a little preliminary difficulty, and as Mr. Metcalf's amendment offered in the guise of an amendment to my amendment is wholly foreign to the object of my amendment, and as it has been adopted, I withdraw my amendment, so that the vote can come upon the original resolution as now amended.

Mr. NORTH.—What are you voting on?

The PRESIDENT.—The resolution, as offered by Mr. Metcalf, as amended by you. The resolution was carried.

The Secretary will now announce the report of the Tellers.

The Secretary read the names of the members elected as the Nominating Committee, as follows: District No. 1, P. F. Brendlinger; No. 2, George S. Field; No. 3, Henry Manley; No. 4, William Metcalf; No. 5, William E. Merrill; No. 6, W. S. Lincoln; No. 7, O. H. Landreth.

The PRESIDENT.—The next business in order will be the report from Mr. Shinn as to the action of the recent meeting in Chicago, of the Committee on "An International Congress and Engineering Headquarters," at which this Society was represented.

Mr. SHINN.—Mr. President, I was unable to attend the meeting of the Convention, although I had intended to do so, but business arising a few days beforehand prevented. The Board of Direction, however, had wisely provided alternates to attend in case the original members of the Committee could not attend, and the Society was fully represented by Mr. D. J. Whittemore, Past President of the Society and one of the original members of the Committee, and Mr. John F. Wallace, one of the alternates. There is a long report, together with the discussions at the meeting, but the result, as I get at it, is as follows (Mr. Shinn then read portions of the report):

ABSTRACT OF PROCEEDINGS OF PERMANENT COMMITTEE ON INTERNATIONAL ENGINEERING CONGRESS AND ENGINEERING HEADQUARTERS, WORLD'S COLUMBIAN EXPOSITION, 1893.

The meeting was called to order at 10.15 A.M., May 15th, 1891, at the rooms of the Western Society of Engineers, 78 La Salle street, Chicago.



The following is a list of the societies participating and their accredited delegates and alternates. Members who were present are designated by a star:

AMERICAN SOCIETY OF CIVIL ENGINEERS—\*D. J. Whittemore, William P. Shinn. *Alternates:* \*John F. Wallace, Colonel William E. Merrill.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS—\*William Forsyth, \*Jesse M. Smith. *Alternates:* H. B. Stone, R. H. Thurston, H. R. Towne.

AMERICAN INSTITUTE OF MINING ENGINEERS—\*Robert W. Hunt, \*H. L. Hollis.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—E. M. Izard, G. M. Barton. *Alternate:* A. H. Bauer.

ENGINEERS' CLUB OF PHILADELPHIA—\*John W. Cloud.

CANADIAN SOCIETY OF CIVIL ENGINEERS—Sir C. S. Gzowski, \*E. P. Hannaford.

BOSTON SOCIETY OF CIVIL ENGINEERS—\*Thomas Appleton.

ENGINEERS' CLUB OF ST. LOUIS—E. D. Meier.

CIVIL ENGINEERS' CLUB OF CLEVELAND—\*William T. Blunt.

ENGINEERS' CLUB OF KANSAS CITY—\*Waterman Stone.

MONTANA SOCIETY OF CIVIL ENGINEERS—Elliott H. Wilson.

CIVIL ENGINEERS' SOCIETY OF ST. PAUL—\*W. W. Curtis.

MINNEAPOLIS SOCIETY OF CIVIL ENGINEERS—\*William A. Pike.

ENGINEERING ASSOCIATION OF THE SOUTHWEST—\*Olin H. Landreth.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA—Alfred E. Hunt.

WESTERN SOCIETY OF CIVIL ENGINEERS—\*E. L. Corthell, \*O. Chanute, \*C. L. Strobel.

Mr. E. L. Corthell was elected temporary chairman. Mr. Weston acted as Secretary *pro tem*.

After some preliminary remarks by Mr. Corthell he introduced the Hon. C. C. Bonney, President of the World's Congress Auxiliary of the World's Columbian Exposition, to explain informally the purpose of the Auxiliary.

"The World's Congress Auxiliary is an organization authorized by the directory of the Exposition, and recognized and approved by Act of Congress, to have charge of all conventions in connection with the Exposition of 1893. This auxiliary has nothing whatever to do with any material exhibit at that exposition. Whatever can be seen belongs to the jurisdiction of our Exposition and the National Commission; whatever is to be spoken and heard belongs to the province of the World's Congress Auxiliary. On the subject of an Engineering Congress there will be a non-resident branch called the Advisory Council of Engineering, the membership of which may be scattered throughout the country and throughout the world, and which should be composed of the most eminent representatives of this profession. This Advisory Council may be composed of say 20 or 50 members, as may be desirable, and would be expected to co-operate with your local committee by means of correspondence at all times, and by personal conference whenever the members can meet you, or any of you, in personal communication."

"Let me now give you an idea of what you may expect in the way of facilities to be offered to the various bodies that will convene here. In endeavoring to bring together the highest representatives of every department of human progress, it is obvious that if they should be brought here indiscriminately, without a careful selection and assignment of time, unutterable confusion would result. We therefore have a plan to commence the first week in May, assigning to each department or group of bodies of the same general nature, a week or ten days or two

weeks in one of the months between May and October inclusive, so that this series of World's Congresses, commencing the first week in May and ending the last week in October, shall, when completed, result in a more complete, comprehensive, and graphic portrayal of the rise, progress, development, and present condition of science, learning and achievement in every line of effort, than has ever yet been presented to mankind. We expect that the papers, addresses and discussions to be presented in these several congresses during the period of six months will be published after the Exposition in an appropriate form, and will constitute the most enduring monument of the success achieved in 1893."

"Our idea is that a great department like that of education, be divided into chapters and sections, the chapter being the first subdivision of a department, and the sections being subdivisions of the chapters; and that each section or chapter will meet by itself and debate the particular questions in which its members are specially concerned; and that the topics in which all the sections are interested will be debated in the chapter to which they belong, and that in the general meeting of the department all matters of common interest will be discussed. The Auxiliary does not propose any interference with whatever plans you as engineers will be pleased to arrange for conducting your Convention, they propose to afford you all the facilities they have at command; audience rooms suitable to your use, every facility for the convenient assembling of your members here, and suitable headquarters we hope will be provided for furthering your convenience."

"We have thought, and I desire you to consider this matter and make any such recommendation as you may think wise—we have thought of providing reserved seats in all the galleries of the places of meeting which shall be provided, and making the announcement throughout the world, that the man in Rome, or Berlin, or London, or elsewhere, who is to come to the Exposition, and especially to attend a given Congress, and who desires to bring his family with him, his wife, his daughters or his sons, may send beforehand and reserve for them seats in the gallery of the hall which will be occupied by this particular Congress, which they shall know have been provided for them, and which they can occupy in peace and without confusion during the session of the Congress. This has not been determined upon, but it is proposed to so provide."

"Every department of human progress which will hold a congress here in Chicago in 1893, will be asked to co-operate with the World's Congress Auxiliary in a series of great union popular meetings for the benefit of the people of Chicago and the people who will come here to attend the Exposition. We think that art and science and literature and every phase of advancement, owe some debt to the people, and that we ought to give them the best opportunity we can afford to see and hear for themselves the great leaders in every department. In arranging a popular meeting, or two or three or four or five popular meetings, according to the nature of the case and the facilities at hand, we would expect to draw on your supply of distinguished engineers whose names have become famous the world over, and if their names have not, their works are known everywhere, even among school children who read of the marvels of engineering genius. An announcement that the men who have devised and superintended the construction of the great triumphs of the engineering arts will relate the story of their great achievements, would draw a larger audience than the most ample audience-room that could be provided could contain. That service we ask

at your hands. The Auxiliary will confer with you and arrange a programme and assign the time for these brief speeches, so that the people, having seen the material exhibit, may be able to say that the leaders in your branch of human advancement were presented to their view—that they saw them and heard them state the condition and outlook of the science to which they were devoted.”

Mr. CORTHELL.—The thanks of this Committee are yours, Judge Bonney, for the very complete and plain statement you have made in reference to the plan for congresses at the Exposition and our relations to it. I think this Committee would like to know, if you can give us the information, at what time during the six months the Congress of Engineering could be held. We notice by the plan given here, that No. 11, Commercial and Financial Congresses, comes late in the season.

President BONNEY.—In answer, Mr. Chairman, I will say that the schedule of time is only set down temporarily or tentatively to invite suggestions, and I suppose it is practicable to fix the meeting of the Congress of Engineering in any one of the six months, as we stand to-day. The reason for putting the Financial and Commercial Congresses toward the close of the season was to bring that conservative and educative influence between the labor men who are to come here in September, as we understand, and the agricultural interests that will come here in October, and we thought nothing would be more beneficial, both ways, than to bring the great financiers and practical men of affairs in between the labor people in September and the agricultural interests in October.

After the retirement of Judge Bonney, Mr. O. Chanute was elected Chairman. Mr. Chanute upon taking the chair returned thanks and called upon Mr. Corthell to explain the purposes of the meeting.

After the remarks of Mr. Corthell and a full discussion of the matter before the meeting, a motion prevailed that the Chair appoint a committee of seven members on organization and the nomination of officers, to report at a session to be held at 8 P.M.

The following committee was appointed: Messrs. Corthell, Hunt, Hannaford, Strobel, Smith, Cloud and Stone.

The meeting adjourned to 8 P.M.

EVENING SESSION.—The meeting was called to order by the permanent Chairman, Mr. O. Chanute, at 8.15 P.M., who called upon the Secretary, *pro tem.*, to read the report of the Committee on Organization and Nominations:

#### REPORT ON ORGANIZATION.

This body shall be called General Committee of Engineering Societies, Columbian Exposition. The objects of this Committee are:

*First.*—To provide on behalf of the Engineering Societies represented on this Committee an Engineering Headquarters for members of all Engineering Societies of the world, who may visit Chicago during the World's Columbian Exposition in 1893.

*Second.*—To promote an International Engineering Congress to be held in Chicago in 1893, under the auspices of the “World's Congress Auxiliary of the World's Columbian Exposition.”

This Committee shall be composed of one member from each of the societies of the United States and Canada which has joined or may join in the plan, except that the American Society of Civil Engineers, the American Society of Mechanical Engineers, the American Institute of Mining Engineers, the American Institute of Electrical Engineers and

the Canadian Society of Civil Engineers, may each appoint two members, and the Western Society of Engineers may appoint three members of this Committee.

The officers of the General Committee shall be a Chairman, a Secretary, a Treasurer and an Executive Committee of seven; the Chairman of the General Committee shall be *ex-officio* a member of the Executive Committee. Four members of the Executive Committee shall constitute a quorum. The Chairman and Executive Committee shall be elected by the General Committee.

The Executive Committee shall have entire charge of promoting the objects of the General Committee, subject to the approval of that Committee.

Vacancies in the Executive Committee shall be filled by the Chairman of the General Committee subject to the approval of the General Committee.

The Secretary and Treasurer shall be appointed by the Executive Committee, subject to the approval of the Chairman of the General Committee. They are not required to be members of the General Committee. The Treasurer shall furnish bonds in such amount as may be designated by the Executive Committee. The compensation of these officers to be fixed by the Executive Committee.

Meetings of the General Committee may be called either by the Chairman of that Committee or by a majority of the Executive Committee.

#### REPORT ON NOMINATIONS.

For President, Octave Chanute. Executive Committee, E. L. Corthell, E. M. Izard, William Forsyth, C. L. Strobel, Robert W. Hunt, John W. Cloud, D. J. Whittemore.

The report was accepted and the Committee discharged.

The report on organization was considered section by section and adopted in detail and as a whole.

The officers nominated were unanimously elected, viz.: President, O. Chanute; Executive Committee, Messrs. E. L. Corthell, E. M. Izard, William Forsyth, C. L. Strobel, Robert W. Hunt, John W. Cloud and D. J. Whittemore.

After some discussion as to the proper place or classification to be given engineering by the World's Congress Auxiliary, the following resolution was offered and adopted:

*Resolved*, That it is the sense of this Committee that the importance of Engineering entitles it to the place of an independent department in the World's Congresses to be held in 1893, under the auspices of the World's Columbian Exposition.

The meeting then adjourned.

This is merely read for the information of the Convention; it calls for no action except that it be accepted, so that it may appear in the *Proceedings*. The appointment of your representative on the Committee was authorized by the annual meeting, and that action is subject to the specific approval by the Board of Direction of any financial plan that may be adopted, so that a motion to accept this report will be in order, and no further action will be required.

A MEMBER.—I move that it be accepted. (The motion was carried.)

Mr. MOORE.—Is it out of order for this meeting to take any action upon it?



The PRESIDENT.—There is no action required.

Mr. MOORE.—Is the Society committed to adopting this report.

The PRESIDENT.—The Society, at the Annual Meeting, referred the action to the Board of Direction, which has had it in hand and will take such action as may be necessary.

The SECRETARY.—The Board of Direction have already acted by appointing the members of this Committee. This report informs you of what has thus far been done.

I have been requested to bring before the Convention the matter of the Eads monument. I have in my hand a circular in relation to it.

A letter sent me requested me to bring the subject before the Convention with the possible result that members here might subscribe such sums as they saw fit, which sums might be sent forward as a subscription from the Convention. I place it in your hands for action.

The PRESIDENT.—I think that a number of members here present have already joined in this movement for the erection of a monument to Captain Eads; those who have not, and who may desire to do so, will find the list in the hands of the Secretary, or Mr. Lee, and may subscribe such sums as they desire.

The Secretary has some reports of Committees.

The SECRETARY.—There are certain reports of standing committees; the first report is on Units of Measurement, and is as follows:

F. COLLINGWOOD, Esq., *Secretary*,  
127 East 23d Street, New York.

DEAR SIR :

I have yours of April 30th in relation to the report of the Committee on Units of Measurement for the coming meeting.

I shall be just starting for Japan by the time of the opening of the meeting. I knew at the annual meeting that I was going, and stated then that it would be impossible to prepare a report for the annual convention of the Society except a report of progress. It would also be inexpedient while the Committee is doing a large amount of preliminary work.

Yours truly,

THOMAS EGLESTON.

The PRESIDENT.—If there is no objection, the Committee will be continued.

The SECRETARY.—The second report is from the Committee on Impurities of Domestic Water Supply, and is as follows:

*To the American Society of Civil Engineers.*

GENTLEMEN:

In the report presented by this Committee on January 21st of the present year, we expressed our intention to wait for further action, until such time as a similar Committee of the American Water Works Association should have reported, in order to determine whether it would be advisable to act in concert with them. That report not having been



published yet, we can only report progress and request that the Committee be continued.

A. FTELEY,  
GEORGE W. RAFTER,  
DESMOND FITZGERALD,  
*Committee on Impurities of Water Supplies.*

The PRESIDENT.—If there be no objection, this Committee will be continued.

The SECRETARY.—The next report is from the Committee on Standard Rail Sections. The Chairman, Mr. Bouscaren, is present.

Mr. G. BOUSCAREN.—On behalf of the Committee on Standard Rail Sections, I beg to state that the members of the Committee have not been able to get together since the last Convention; all communications have been made by correspondence, and we have not progressed so far as to be able to report to this Convention; we can only report progress. We are at work on the sections and hope to make a definite report at the next meeting.

Mr. Bouscaren also reported, on behalf of the Committee on Structural Materials, as follows: I can only report progress. The Secretary of the Committee is not here; he was expected but could not come, and he has all the papers of the Committee. A great deal of work has already been done by this Committee.

The PRESIDENT.—These two Committees will be continued.

The SECRETARY.—The remaining standing Committee is that on Standard Time, and it desires to be continued.

The PRESIDENT.—If there is no objection, it is so ordered.

The SECRETARY.—The next report is the report on the Cause of Failure of the South Fork Dam. That report I have in hand and if the Convention desires, I am requested by the Chairman of the Committee to read it. I may state in that connection, the report has been ready for a considerable length of time but as the matter was in the courts, it was deemed improper to have such a matter presented here until the suits were decided. The time for personal liability is now past and the principal suit has been decided in favor of the idea that it was absolutely impossible to have foreseen this disaster; in other words, that it was the act of God, and the Committee now feel desirous of presenting the report.

The PRESIDENT.—How long would it take to present the report?

The SECRETARY.—Perhaps a half hour, to read the report.

The PRESIDENT.—What is the wish of the Convention?

Mr. BOUSCAREN.—I move that the report be read, because there is quite a number who are going away this afternoon, who are anxious to hear it.

The PRESIDENT.—I think we may proceed to the reading of the report.

The Secretary read the report, which will be printed in the next issue of the *Transactions*.

The PRESIDENT.—Gentlemen, you have heard this very able report, what will you do with it?

Mr. SHINN.—I move that it be accepted, and that the thanks of the Society be extended to the Committee for their labors. (Motion carried.)

The PRESIDENT.—The report having been accepted, it is now in the hands of the Society to be discussed. Is there any suggestion as to the time at which this may be done? It may be desirable that it should be while the matter is fresh in our minds and we might appoint the time of our reassembling at 3 o'clock this afternoon for the discussion of this subject. A motion to that effect will be in order.

On motion, the discussion of the report of the Committee on the Cause of Failure of the South Fork Dam was appointed for 3 o'clock.

The PRESIDENT.—The meeting now stands adjourned until 3 o'clock.

---

#### MAY 23D.—AFTERNOON SESSION.

The PRESIDENT.—We will now resume the business meeting and discuss the report which was read by the Secretary just before our adjournment this morning. After the discussion is closed, if there is no further business brought before the business meeting by members present, this meeting will adjourn, and we will resume the sitting of the Convention, or adjourn to Monday morning, as may be preferred.

(The report was then discussed, and the discussion will be printed with the report in the *Transactions*.)

The PRESIDENT.—Does any other member wish to discuss this report? If not, has any member any business to bring before the business meeting?

If there is no further business the meeting can adjourn as a business meeting and *resume* in Convention the reading of papers.

Mr. MOORE.—I move that the business meeting do now adjourn. (Carried.)

---

#### ANNUAL CONVENTION OF THE SOCIETY HELD AT LOOKOUT MOUNTAIN, TENN., MAY 21ST-25TH, 1891.

FIRST SESSION, THURSDAY, MAY 21ST, MORNING.—The Convention was called to order by the President of the Society, Mr. O. Chanute, and organized first as a business meeting. After a short session, of which the proceedings are given under that head, the business meeting adjourned, and the regular session of the Convention began.

The Secretary made various announcements, after which the Presi-

dent called for the first paper on the programme, entitled, "American Irrigation Engineering," by Mr. Herbert M. Wilson, M. Am. Soc. C. E. The paper was read by the author and discussed by Messrs. North, Bouscaren, Francis, Harris, Trautwine, Merrill, Skinner, Moore and Wilson.

SECOND SESSION, THURSDAY AFTERNOON.—The first paper was on the "Origin and Evolution of the American Railroad Viaduct," by Mr. John E. Greiner, M. Am. Soc. C. E. It was read by the Secretary and discussed by Messrs. Morison, Bouscaren, Thacher and Moore.

The Secretary then read a paper on "Free Railway Construction vs. Government Controlled and Owned Railroads," by E. Bates Dorsey, M. Am. Soc. C. E., which was discussed by Mr. Robert Moore.

A paper on the "Advantages of a Longitudinal Bearing System for Railway Tracks," by Mr. T. C. Clarke, M. Am. Soc. C. E., was read by Mr. Skinner. A written discussion by Mr. J. Foster Crowell was read, and the paper was also discussed by Messrs. Shinn, Prout, Francis, Brendlinger, Chanute, Crosby, Tratman, Owen, Goad, North, Hunter McDonald, Hovey and Moore.

A paper on "Mountain Railroad Construction," by William Barclay Parsons, was read by the Secretary.

A paper by Julien A. Hall on "Right of Way for Railroads," read at a previous meeting of the Society, was then discussed by Messrs. Shinn, Moore, Nicholson, Brush, Brooks and Read.

THIRD SESSION, THURSDAY EVENING.—The meeting was called to order by Past President William P. Shinn, who occupied the chair.

Colonel Tomlinson Fort, President of the Chamber of Commerce of Chattanooga, made an address of welcome, which was responded to by Mr. Shinn.

This was followed by an address on the "Geology and Topography of Lookout Mountain and the Region About," given by Professor J. M. Spofford, State Geologist.

Hon. Xenophon Wheeler gave some historical notes, and was followed by Colonel William R. King, U. S. A., who discussed the engineering features of the locality.

Full abstracts of these addresses will be given in the next number of the Proceedings.

FRIDAY, MAY 22D, was occupied by an excursion by steamer down the Tennessee River to Shell Mound, returning by rail.

FOURTH SESSION, FRIDAY EVENING.—The President of the Society, Mr. O. Chanute, delivered the Annual Address, which was illustrated by lantern views of many important works.

At its close Mr. H. C. Hovey gave an interesting exhibition of lantern slides of Luray and other caves.

FIFTH SESSION, SATURDAY, MAY 23D, MORNING.—The Convention met for the regular business meeting held during the Convention, the President in the chair, after which the Convention resumed its session.

The first paper read was by Mr. John Thomson, M. Am. Soc. C. E., entitled, "A Memoir on Water Meters."

Mr. John M. Goodwin then exhibited a series of maps and blue prints relating to the proposed Lake Erie and Ohio River Ship Canal, and made extended explanations of them.

Mr. North discussed them and Mr. Goodwin replied.

SATURDAY EVENING.—The banquet was held at the hotel, and was attended by one hundred and forty persons, including ladies.

SIXTH SESSION, MONDAY, MAY 25TH, MORNING.—The President occupied the chair and called the meeting to order.

Mr. Ward Baldwin, M. Am. Soc. C. E., read a paper on the "Influence of Curvature and Elevation of Track on the Stresses in Bridges." It was discussed by Professor Charles E. Greene.

The PRESIDENT.—The next paper is on "Sections and Mechanical Conditions of Car Wheels," by Mr. P. H. Griffin, Assoc. Am. Soc. C. E.

Mr. METCALF.—May I offer a resolution?

The PRESIDENT.—You may.

Mr. METCALF.—This matter, I think, would have been properly brought before the business meeting; however, it is one on which this Convention could take no action, it can only recommend. I have heard a great deal of discussion that the debt upon the Society House in New York hangs pretty heavily, and if this were so, I thought that the probabilities were that the Board might like to have the sense of this Convention whether it would be better to set aside a sinking fund to pay off that debt and minimize the expenses, or whether the sense of the Convention would be opposed to this. It would seem entirely proper that this Convention should make a suggestion, that the Board take up the question, and I will offer this resolution—if ruled out of order there is no harm done:

*Resolved*, That it is the sense of this Convention that it would probably be wise to set aside the entrance fees received from new members, into a fund for the purpose of paying the balance due upon the house of the Society, and that the Board of Direction be requested to give the subject such consideration and action as may seem most appropriate.

The resolution was seconded.

The PRESIDENT.—It is unfortunate that there are so few members present to act upon that resolution.

Mr. METCALF.—I would ask that action be postponed, if you don't rule it out of order, until there is a larger attendance.

The PRESIDENT.—It is, however, only an expression of opinion which is in no way binding.

Mr. METCALF.—I offer it merely in the hope of bringing out some discussion from the members here as to whether they would prefer to have some arrangements made for a sinking fund to pay off our debts and get out of debt, and that the suggestion, coming from the Conven-

tion, would receive very careful consideration by the Board. It is not interfering in any way, I think, with the Board to make a suggestion to look into the matter.

Mr. B. M. HARROD.—For what purpose is the fund that you propose to so devote, now used? What economy would have to be practiced? I, of course, know nothing about the current expenses. Would it cripple the publications at all?

The PRESIDENT.—That would be a matter for the Board to take into consideration; it can only be found upon an examination of the income and outgo of the Society, and it is, of course, possible that upon examination being made it will be found that it is undesirable to set aside the entrance fees for a special fund.

Mr. HARROD.—If it would require any economizing of the publications of the Society, I would be opposed to it. Those members living at a distance from New York, I think, would feel in that way.

The SECRETARY.—In times past it has not been possible to do this thing, and I am sure the Board will not take such action, if it should cripple the publications. I think the wish of the Board is to add every possible scope to the publications as to matter which it is really desirable to publish and to increase the amount. The Board would be very glad to reduce the debt as soon as they can, but the interest is only about 5 per cent., or \$800 a year, and it would not be sound policy to reduce the publications or cripple them, in order to pay a mortgage which causes no trouble, and can remain indefinitely; I quite agree with the sense of the resolution, however. The income of the Society is being very carefully looked after, and we have succeeded this year in getting the postage reduced for the first time.

Mr. METCALF.—Most certainly if I thought that the result of this action would be the cutting off of one page of publication useful to the Society I never would have offered any such resolution. I only hope that the publications will be extended from year to year by careful management of the income of the Society so that the benefit that we receive from the *Transactions* may be increased from year to year. But I had understood that the Board were considering this question, and I thought that an expression of opinion from the Convention that when they can do it, it would be wise to set aside these fees for a sinking fund, would be an expression of opinion the Board would like to have, as coming from members from all parts of the country, of the propriety of getting our debt paid off.

Mr. HARROD.—I merely asked the question, being perfectly ignorant of the policy of economy of the Society and which Mr. Metcalf and the President have brought out.

The President put the vote and the resolution was carried.

Mr. Griffin read his paper on "Sections of Car Wheels," and it was discussed by Messrs. Nicholson, Chanute and Griffin.



Mr. Skinner read the paper by Latham Anderson, M. Am. Soc. C. E., on "The Single Trap System of House Drainage." It was discussed by Messrs. Brush and Collingwood.

The Secretary read a paper by E. Gillette, Jr., M. Am. Soc. C. E., entitled "A Trip Through the Big Horn Cañon."

Mr. Fred. Brooks read a paper by Mr. Desmond FitzGerald, M. Am. Soc. C. E., entitled "Yield of the Sudbury River Water Shed in the Freshet of February 10th, 13th, 1886, and it was discussed by Messrs. Francis and Collingwood.

The Secretary read the list of papers still remaining, as follows: "On the Construction of the Chimney for the Narragansett Electric Lighting Company," by Mr. John T. Henthorne, M. Am. Soc. C. E.; "On the Straits of Juan de Fuca, Puget Sound," by B. W. De Courcy, M. Am. Soc. C. E.; "Notes on Cement, Mortars and Concrete," by William H. Grant, M. Am. Soc. C. E.; "Neat Tests *vs.* Sound Tests for Portland Cement," by S. Bent Russell, M. Am. Soc. C. E.; "Discussion of Paper No. 444, Reducing Internal Wastes of the Steam Engine," by Robert H. Thurston, M. Am. Soc. C. E.

Mr. Skinner moved that the announcement of the papers by title be considered as equivalent to their being read, and that they be published hereafter in the *Transactions*. (The motion was carried.)

THE PRESIDENT.—What is the pleasure of the Convention?

Mr. NORTH.—Mr. President, at the close of every Convention it is customary to return thanks for the attentions we have received. This is sometimes a perfunctory duty and sometimes a great pleasure. I have been congratulating myself on having been one of those who desired Chattanooga as a place for the Convention, and I wish to propose a vote of thanks to all these friends, to the Board of Management in general, and to Mr. Whinery in particular, for the arrangements that have been made; to the gentlemen here in Chattanooga whose names are well known for their many kind attentions to us, and to express the thanks of the Society to Mr. Nicholson and to all the gentlemen connected with the railroads for their many services to us which have rendered our stay so pleasant; with the request that the Secretary send a copy of this vote of thanks to these gentlemen.

The SECRETARY.—I wish to add to what Mr. North has said that it is particularly due to Mr. Whinery that the Convention has been so successful. We have never had a committee-man who has done more work; we have probably had men who have done as much, but Mr. Whinery has made several trips from Cincinnati to Chattanooga, and has been, indefatigable in seeing that all things worked harmoniously.

Mr. NORTH.—Mr. President, I thought everybody knew that or I would have said it, not so nicely, however, as Mr. Collingwood has.

(The motion was carried.) The Convention then adjourned *sine die*.

The following 121 members were in attendance at the Convention:

John B. Atkinson, Earlington, Ky.; Dexter Brackett, Fred. Brooks, Boston, Mass.; William D. Bullock, Providence, R. I.; John W. Bacon, Danbury, Conn.; Charles B. Brush, L. L. Buck, New York; P. F. Brendlinger, Yonkers, N. Y.; Ward Baldwin, G. Bouscaren, Cincinnati, Ohio; George H. Benzenberg, Milwaukee, Wis.; Julius Baier, St. Louis, Daniel Bontecou, Kansas City, Mo.; F. Collingwood, Elizabeth, N. J.; Robert A. Cummings, Roanoke, Va.; W. H. Courtenay, Louisville, Ky.; R. L. Cobb, Clarksville, Tenn.; George H. Clark, Cedartown, Ga.; H. St. L. Coppée, Vicksburg, Miss.; O. Chanute, Chicago, Ill.; Benjamin L. Crosby, St. Louis, Mo.; Stancliff B. Downes, New York City; George S. Davison, Pittsburgh, Paul Didier, Allegheny, Pa.; George E. Evans, Lowell, Mass.; Oscar Erlandsen, Mt. Carmel, Pa.; Robert L. Eugle, Louisville, Ky.; James B. Francis, Lowell, John R. Freeman, Boston, Mass.; George H. Frost, New York City; John A. Fulton, Cleveland, Ohio; Asa B. Fitch, Terre Haute, Ind.; H. Frazier, Cincinnati, Ohio; James L. Frazier, Louisville, Ky.; Wilbur F. Foster, Nashville, Tenn.; William Gibson, Jr., New York City; Bernard R. Green, Washington, D. C.; P. H. Griffin, Buffalo, N. Y.; Charles E. Goad, Montreal, Canada; Charles E. Greene, Ann Arbor, Mich.; John M. Goodwin, Sharpsville, Pa.; Henry Goldmark, Kansas City, Mo.; G. F. Haynes, Boston, Mass.; Bentley D. Hasell, Rudolph Hering, New York City; William E. Hoyt, Rochester, N. Y.; James H. Harlow, Pittsburgh, Pa.; David C. Humphreys, Lexington, Va.; W. P. Harris, Johnson City, Tenn.; Arthur Hider, Greenville, Miss.; B. M. Harrod, New Orleans, La.; Horace E. Horton, Robert W. Hunt, Chicago, Ill.; J. W. Hoover, Kansas City, Mo.; William C. Jewett, Chattanooga, Tenn.; Joseph M. Knap, New York City; Louis H. Knapp, Buffalo, N. Y.; Gustave Kaufman, Pittsburgh, Pa.; George W. Kittredge, Indianapolis, Ind.; Gustav Lindenthal, Pittsburgh, Pa.; Thomas D. Lovett, Cincinnati, Ohio; William H. Lotz, Chicago, Ill.; Olin H. Landreth, Nashville, Tenn.; Sidney F. Lewis, New Orleans, La.; Thomas H. McCann, Hoboken, N. J.; E. T. D. Myers, Richmond, Va.; John J. McVean, Grand Rapids, Mich.; William Metcalf, Pittsburgh, Pa.; William E. Merrill, Cincinnati, Arthur L. Mills, Toledo, Ohio; John MacLeod, R. Montfort, Marshall Morris, Louisville, Ky.; George S. Morison, Chicago, Ill.; Robert Moore, St. Louis, Mo.; Gouverneur Morris, Johnson City, R. C. Morris, Nashville, Tenn.; R. C. McCalla, Tuscaloosa, Ala.; Hunter McDonald, Atlanta, Ga.; Edward P. North, New York City; George B. Nicholson, Covington, Ky.; Alfred Noble, Memphis, Tenn.; James Owen, Newark, N. J.; Frank C. Osborn, Cleveland, Ohio; H. G. Prout, New York City; Alfred Petry, Covington, Ky.; Charles O. Parker, Chattanooga, Tenn.; Arthur Pew, Talbotton, Ga.; William Roberts, Waltham, Mass.; Samuel Rea, Pittsburgh, Pa.; Robert L. Read, William B. Ruggles, Cincinnati, Ohio; Henry B. Richardson, New Or-

leans, La.; Frank W. Skinner, New York City; T. Guilford Smith, Buffalo, N. Y.; William P. Shinn, Pittsburgh, Pa.; William Scherzer, Chicago, H. R. Stanford, Alton, Ill.; Charles Seymour, Madisonville, Ky.; Robert Somerville, Greenville, Miss.; L. W. Stubbs, Monroe, La.; Merritt H. Smith, Phillips, Fla.; John Thomson, Stevenson Towle, E. E. Russell Tratman, New York City; John C. Trautwine, Jr., Philadelphia, Pa.; Edwin Thacher, Louisville, Ky.; Benjamin Thompson, Chattanooga, Tenn.; N. J. Welton, Waterbury, Conn.; William H. Wiley, New York City; Herbert M. Wilson, Washington, D. C.; Charles D. Ward, Oswego, N. Y.; J. W. Walker, William Glyde Wilkins, Pittsburgh, Pa.; Fred. C. Weir, S. Whinery, Cincinnati, Ohio; J. E. Willard, Crescent Hill, Ky.; Arthur Owen Wilson, Huntsville, Ala.; Charles Francis Wood, Knoxville, J. S. Walker, Nashville, Tenn.; C. P. Yeatman, Grand View, Tenn.

Forty-seven ladies of the families of members accompanied them on the occasion of this Convention. There were also a large number of guests from Cincinnati, Chattanooga and elsewhere.

#### OF THE BOARD OF DIRECTION.

MAY 5TH, 1891.—Letters from members of the Board in reference to the new Constitution were read. The Finance Committee, in conjunction with the Treasurer, presented a list of the members in arrears. It was ordered that Forms 12 and 13 be sent to all members in arrears. Mr. John F. Wallace and Colonel William E. Merrill were appointed alternate delegates to represent the Society on the General Permanent Committee on International Congress and Engineering Headquarters in Chicago. Applications were considered. General business transacted. Invitations to Convention ordered issued.

---

### MEMOIRS OF DECEASED MEMBERS.

---

#### FREDERICK FLOYD WELD, M. Am. Soc. C. E.

---

DIED JUNE 28TH, 1890.

---

Frederick Floyd Weld, son of Frederick A. and Mary D. Washburn Weld, was born in Sag Harbor, Long Island, February 19th, 1850.

His father was the captain of a vessel, and it was but natural that, when the time came for him to choose a profession, his thoughts should

turn toward the ocean. He made application, endorsed by the Governor of Connecticut and other prominent citizens of the State, for appointment as cadet engineer at the Naval Academy at Annapolis. Receiving assurance that his application would be granted, provided he was qualified to enter, he prepared himself to pass the necessary examinations. For some reason Congress failed to pass the necessary appropriations for the Academy for that year, and young Weld entered the Sheffield Scientific School instead, selecting the civil engineering course, and graduating in the class of 1872.

For about a year after graduation he was in the employ of the United States Coast Survey, in the survey of the Delaware River from Easton to Trenton. In August, 1873, he obtained a position as draughtsman and general assistant in the office of the City Engineer, New Haven, Conn., which position he held until July, 1881, when he resigned in order to accept a more lucrative position as Managing Engineer for Thomas P. Simpson, railroad contractor, on the Pittsburgh and Western Railroad.

In the summer of 1883 Mr. Weld accepted a position as Assistant Engineer in charge of the construction of a system of sewers, in Waterbury, Conn., which had been designed by Mr. Rudolph Hering. So ably did he conduct the affairs committed to his charge, that when a few months later, a vacancy occurred in the office of City Engineer, caused by the resignation of N. J. Welton, he was at once selected to fill the position. This office he held continuously, under different administrations, until his death, June 28th, 1890.

For several years he had been a prominent and active member of the Waterbury Board of Health, and although a large portion of his thought and time had been given to devising means for checking the ravages of preventable diseases, he was the first to fall a victim in an epidemic of typhoid fever which prevailed in Waterbury in the summer of 1890.

While in Waterbury, Mr. Weld, together with H. J. Kellogg his first assistant, designed a system of sewers for the Borough of Wallingford, Conn. He also served as Consulting Engineer for the construction of the sewerage systems of Torrington and Ansonia, besides for other less important engineering works.

Mr. Weld became a Member of the American Society of Civil Engineers September 3d, 1884.

He was also one of the leading members of the Connecticut Civil Engineers' and Surveyors' Association, and, at the time of his death, was the President of the Society.

As a man, Mr. Weld was genial and social in his nature, a hard worker, of strict integrity, and a true friend; as an engineer he possessed considerable ingenuity and a good fund of sound common sense; a tact for getting along with people with whom he came in contact professionally, and securing a compliance with his plans without arousing unpleasant antagonism. He was quick and accurate in the performance

of his duties; while the work which he executed in New Haven and Waterbury will long bear silent witness to the thoroughness and painstaking effort which he bestowed on every detail.

Although he was so surrounded by circumstances that he was unable to reap a large pecuniary reward for his labors, or reach a high pinnacle of fame, yet he leaves behind him that which is worth more than either, a worthy character and an honored name.

On December 15th, 1874, Mr. Weld married, at New Haven, Miss Mary V. Crockett. Two daughters were born to them, both of whom, with his wife, survive him.

---

**WILLIAM HENRY ATWOOD, M. Am. Soc. C. E.\***

---

DIED SEPTEMBER 4TH, 1890.

---

William H. Atwood was born at Chatham, Mass., August 28th, 1851. His boyhood days were spent among the scenes of that charming sea coast, "the elbow" of Cape Cod. There was laid the foundation of that ardent love of nature and the good and true which was so characteristic of his whole life. His ancestors for several generations were known to be men of sterling worth. A great great grandfather, Joseph Atwood, born at Eastham, Mass., in 1720, was a "noted navigator of unfrequented parts of the world." He, together with five successive generations, occupied the house in which Mr. Atwood was born and in which he also died, he having purchased the house that it might be preserved in the family. Mr. Atwood was the son of John and Abbie Doane Atwood; they were both direct descendants of early settlers who followed closely the landing of the Pilgrim Fathers. John Atwood was State Senator from Barnstable County in 1857. In 1864 he removed with his family to Jersey City where the subject of our sketch attended the preparatory school at Hasbrouck Institute. He early decided to follow the profession of an engineer, and entered the engineering class of the New York University, graduating B. S. and C. E. in 1872. At least two of his vacations were spent in acquiring practical knowledge of field-work on railways. In the summer of 1872 Mr. Atwood entered the service of the Delaware and Hudson Canal Company, on their New York and Canada Railroad along the west shore of Lake Champlain. There the writer made his acquaintance, and soon learned to admire his earnest, energetic character, and intelligent application to the details of con-

---

\* Committee to prepare memoir, S. B. McKee, M. Am. Soc. C. E.



struction. On that work he was directly connected with Mr. James P. Green, a man of method and exactness, under whose direction he acquired methods of doing work and keeping papers that soon led to his advancement from the position of rodman to that of Resident Engineer, which he retained until the completion of the work in 1874. He frequently remarked that he considered himself particularly fortunate in having the systematic training of such a man as Mr. Green. In the winter of 1874-75 he was for a short time on some work the State of Massachusetts was doing in improving "South Boston Flats." He was there offered, and accepted, the position of Resident Engineer on the Troy and Greenfield Railroad, which he held until 1876. Having largely the responsibility of designing and carrying to completion the large number of structures on his section, he soon developed more fully the strong natural executive ability for which he was so markedly noted. In 1877 he was appointed Assistant Engineer on the construction of the New York Elevated Railroad. His particular duties were the supervision of sections of location surveys, track superstructure, and the foundations and yard work of the company's shops at Third avenue and 98th street. He remained on that work until 1880, when the West Shore Railroad project was begun and he was given charge of all surveys between Jersey City and Haverstraw tunnel.

During construction Mr. Atwood held the position of Division Engineer of the Southern Division which included the Weehawken terminal work and tunnel. The tunnel and approaches aggregating about one mile in length. Mr. Atwood remained until the completion of the work in 1883. About that time the construction of the South Pennsylvania Railroad began and he was offered the position of Division Engineer and took charge of the Fannettsburg Division.

The work here undertaken was very heavy, the country mountainous and forbidding to the ordinary mortal, but just the country to gladden the heart of an engineer fitted by natural ability and former experience to carefully organize and direct the subduing of nature to the uses of man. On his division there were three tunnels, averaging nearly 1 mile in length each, and one iron viaduct 1 100 x 100 feet. Mr. Atwood took hold of this work with his customary energy, "soon mastering its geology," and although the line was one located by most careful and elaborate surveys, he suggested improvements that had not occurred to others, and for which he received especial praise from his superiors.

In 1885, owing to the manipulations of financiers, the work was suspended, and Mr. Atwood, with many others, was obliged to forego the pleasure of the "final." After a short interim, which was spent with his family on a pleasure trip to Florida, he took charge of a division on the construction of the Colorado Midland Railroad. This work was heavy, having one or more tunnels on its route.

In 1887 he again took the position of Assistant to Chief Engineer of the Toledo, St. Louis and Kansas City Railroad, and in 1888 held the same position on the Lake Shore and Michigan Southern Railroad. During this period he also acted as arbitrator in adjusting claims in dispute between contractors and railroad companies.

In 1889 he took the position of Division Engineer on the Cumberland Valley Extension of the Louisville and Nashville Railroad. The work was of such character that it required close attention. Exposure to the summer fever poisons of that region, with added care and responsibility owing to the sickness of many of his men, gradually weakened his usually healthy system which failed to throw off the poisons. He had anticipated spending a vacation in August of 1890 at his old home on Cape Cod, where his family were spending the summer. Upon going down there he kept about for nearly one week "by sheer force of will," and was finally called to his Master after suffering typhoid for about one week. He died on September 4th, 1890. "We buried him there in the home by the sea that he loved so well, beside all his dear ones—his brother, his parents and his two children."

Thus passed away from the scenes of a very busy life one of the bright and active intellects that graced the profession of civil engineer. He was one of three brothers that had all chosen the profession.

Mr. Atwood was a man combining in a charming manner the qualities necessary for the rugged work to be encountered, together with those that plainly showed that he lived for and in a higher life. One who knew and entrusted him with very important work, writes of the impressions of first acquaintance: "His youthful aspect and modest manner caused a transient doubt that he might be unequal to the charge sought. The misgiving was brief. It did not survive the first interview. Through the embarrassment of new acquaintance, of native diffidence and, what has wrung all our withers, the shame of going to market,—presently emerged an intellectual promptitude and decision which certified ability and dominated the hesitancies and reluctancies of a coy nature.

"This interesting trait revealed itself more fully in our subsequent association; moral and mental energy consorted with tender sensibilities, almost feminine in delicacy. It was an attractive charm of his character. He was thorough and exact in his work; of an industry to cope with any labor. Whatever his mind devised or his hand undertook, achievement must lie

" 'Round and perfect as a star.' "

to satisfy the fastidious essence in him and to preserve self-respect. Hence all his official papers were marked by a beautiful propriety, adequacy and elaboration of detail, no particulars slighted more than nature slights her grass. Illustrations of his completeness may be seen in his contributions to *Engineering News* on "Tunnel Working." An-

other says: "A man of the highest integrity and character, conscientious and faithful in the discharge of any duties entrusted to him; one who had made good use of his training and experience and was able to profit by them. His special strength seemed to be in his ability in planning work, and in his good judgment in matters of location and construction. As a designer of the details necessary for important construction works he ranked very high, and was in all respects an engineer much above the average."

Another says: "I always had the highest regard, both personally and professionally, for him, and a great admiration, not only for his marked professional ability, but for his sterling qualities, exact accuracy, genuine integrity, and industry in the service of his employers. I have always regarded him as one of the most promising young assistant engineers that it has ever been my good fortune to have associated with me."

Mr. Atwood, in October, 1875, married Elizabeth, daughter of Valentine Havens, of Jersey City. They had four children. Two died young, and two—Albert William, aged twelve years, and Edwin H., aged six years—are now living with their mother in Cleveland, Ohio, where Mr. Atwood had located, and built him a beautiful home. His home life was that of a consistent christian, husband and father. The writer, with many others, have had various opportunities of witnessing the charm there was about his well-regulated household. The one serious obstruction to his happiness—and the one which so many engineers will recognize—was being separated from his family in the discharge of stern duty. Devoted, kind and true, we may well in the language of a friend, "crown him with the aurelian garland of benediction—simple, good, pure, serious, free from affectation, a friend of justice, a worshiper of God. Kind, affectionate, strenuous in all right action."

Mrs. Atwood died at her home in Cleveland on May 23d, 1891.

---

### SAMUEL H. MILLER, M. Am. Soc. C. E.\*

---

DIED MARCH 18TH, 1891.

---

Samuel H. Miller was born of Quaker parents in Kensington, O., in 1829. His educational advantages were not very liberal, but they seem to have been sufficient to serve as a basis for his after acquirement of knowledge by study and observation, which his natural ability enabled him to use with such effectiveness as to place him in the front rank of his profession.

---

\* For the estimate of the character of Mr. Miller and some of the points in his life-work, we are indebted to a minute from the proceedings of the Western Society of Engineers.

His first engineering experience was gained in the location and construction of the Beaver and Wheeling Branches of the Cleveland and Pittsburgh Railroad, on which, from 1852 to 1857, he was employed as rodman and division assistant. From March, 1863, to March, 1864, he served as Assistant Engineer in the Cleveland and Mahoning Railroad, and from the latter date to April, 1865, as Assistant Engineer in charge of dock construction, masonry and earthwork, on Section 1 of the Mahoning Branch of the Atlantic and Great Western Railroad, with headquarters at Meadville, Pa. After that he did a great deal of work for proprietary companies in the Oil Creek region.

In April, 1865, he was appointed Resident Engineer on the first and second divisions and the Franklin Branch of the Atlantic and Great Western Railway, and continued in this position until May, 1869, when he assumed a similar one on the third and fourth divisions of the same road.

In December, 1869, he was appointed Engineer in Charge of Construction, and served in this capacity until November, 1872.

From January, 1873, to February, 1874, Mr. Miller had charge, as Chief Engineer, of the Hannibal and St. Joseph Railroad.

In August, 1874, he went to Cleveland, O., and as Assistant City Engineer, had entire charge of the construction of the Superior Street Viaduct in that city. After five years' service in this position, he was engaged for a short time in 1879 as engineer for the contractors engaged in constructing the Chicago and Grand Trunk Railroad, then building from Valparaiso, Ind., to Chicago.

From February to November, 1880, he was in charge of the location and construction of the Danville and Grape Creek Railroad, now forming a portion of the Chicago and Eastern Illinois Railroad. From this work he passed to the chief engineership of the latter road, which position he held until March, 1890.

At the time he was stricken with the illness which ended his useful career he was in charge of the construction of the second track of the Chicago and Western Indiana Railroad, between Oakdale, Ill., and Dalton, Ind., including the erection of a double-track draw-bridge across the Calumet River at Riverdale, Ill.

In his private life Mr. Miller was modest and unassuming—rather shunning society on account of his infirmity of deafness—but with his friends he was genial and companionable. His studious habits and cultivated mind made his conversation both instructive and entertaining. He had mastered the French language, and was well read in the best literature of the profession in that tongue, and he kept abreast with the best theory and practice of his day. He was honorable in all things, and faithful to friendship and to duty. A man of strong character, with clear perceptions of right and a steadfastness in maintaining it which never faltered.

The ranks will close up and the gap which he has left will be filled, but he will not be forgotten while the substantial monuments which he left here and there throughout our land remain to attest his ability and skill.

Mr. Miller became a Member of the American Society of Civil Engineers, September 6th, 1882.

## LIST OF MEMBERS.

### ADDITIONS.

#### MEMBERS.

		Date of Election.
ALLEN, WILLIAM ALBERT.....	Chief Engineer Maine Central R. R., Port- land, Me.....	May 6, 1891
BURR, EDWARD.....	First Lieut. Corps of Engi- neers U. S. A., Cascade Locks, Ore.....	May 6, 1891
GAY, CHARLES WEBSTER.....	City Engineer, Lynn, Mass .....	May 6, 1891
JACKMAN, HOWARD HILL.....	City Engineer, 416 West Elm st., Wichita, Kans.	May 6, 1891
RITCHIE, JAMES.....	454 Arcade, Cleveland, Ohio.....	Nov. 5, 1890
TUCKER, HOOD.....	Engineer in charge Harri- man Coal and Iron Ry., Harriman, Tenn.....	Oct. 1, 1890
WHITTON, ANDREW DEMPSTER.....	Chief Engineer Philadel- phia Traction Co., 23d and Brown sts., Phila- delphia, Pa.....	May 6, 1891

#### ASSOCIATE MEMBERS.

ARENTZ, FREDERIK CHRISTIAN HOLBERG.	620 Chestnut st., St. Louis, Mo.....	May 6, 1891
CATTELL, WILLIAM ASHBURNER.....	Assistant Chief Engineer Long Island R. R., Long Island City, N. Y.	May 6, 1891
GRANT, THOMAS HENRY.....	Red Bank, N. J.....	May 6, 1891
JANNEY, WILLIAM DEAN.....	Division Engineer Ohio Ex. N. & W. R. R., Ceredo, W. Va.....	May 6, 1891
MORLEY, FRED.....	Ann Arbor, Mich.....	May 6, 1891
STARRETT, THEODORE.....	23 Thirty-fifth st., Chi- cago, Ill.....	May 6, 1891



	Date of Election.
STOUT, EDMUND COFFIN.....	42 Broadway, New York City..... May 6, 1891
URQUHART, GEORGE COPELAND.....	Steubenville, Ohio..... May 6, 1891
VON GEMMINGEN, SIGMUND.....	P. O. Box 109, Richmond, Va..... May 6, 1891
WARNER, EDWIN HALL .....	Cor. Second and Cherry sts., Seattle, Wash.... May 6, 1891

## JUNIORS.

BERRALL, JAMES .....	Biltmore, N. C . . . . May 5, 1891
CHIBAS, EDUARDO JUSTO ....	Resident Engineer Ysabe- lita Manganese Mines, Santiago de Cuba..... Mar. 31, 1891
McCONNELL, EDWARD THOMAS.....	Engineer Maintenance of Way Peoria Div. C. C. C. & St. L. Ry., Indian- apolis, Ind..... May 5, 1891
McGUIRE, JAMES CLARK.....	The Albany, Cor. 17th and H. sts., Washington, D. C..... May 5, 1891
ROGGE, JOHN CHARLES LEWIS.....	2800 Third ave., New York City..... Mar. 31, 1891
SMITH, PEMBERTON.....	Assistant Supervisor P. R. R., Jersey City, N. J.. Mar. 31, 1891
WILSON, FRANK WALTER.....	1105 E. Main st., Rich- mond, Va..... May 5, 1891
WOOD, ARTHUR HASTINGS.....	National City, Cal..... Mar. 31, 1891

## CHANGES AND CORRECTIONS.

## MEMBERS.

BOEKE, AUGUSTUS W.....	Lock Box 94, Argentine. Kans.
BREEN, HOWARD.....	142 E. Fifth st., Cincinnati, Ohio.
BREITHAUP, WILLIAM H.....	18 Broadway, New York City.
BURR, WILLIAM H .....	Vice-President SooySmith & Co., 2 Nassau st., New York City.
DENNIS, WILLIAM F.....	Shafer Bldg., Richmond, Va.
DOANE, WALTER A.....	Principal Assistant Engineer Ohio Ex. N. & W. R. R., Kenova, W. Va.
EAYRS, NORMAN W.....	General Manager Wheeling Bridge and Terminal Ry., Wheeling, W. Va.
ELLIS, S. CLARENCE.....	Chief Engineer Board of Surveys, 328 Exchange Bldg., Boston, Mass.
FANNING, JOHN T.....	Kasota Block, Minneapolis, Minn.
FERGUSON, JOHN W .....	Metuchin, N. J.
FIESER, L. F.....	210 South High st., Columbus, Ohio.
FITZGERALD, J. LELAND.....	Wedge Bldg., Schenectady, N. Y.
FRITH, ARTHUR J.....	New Brighton, Richmond Co., N. Y.
GIELOW, HENRY J.....	29 Broadway, Room 80, New York City.

GOLDMARK, HENRY.....	Thayer Bldg., Kansas City, Mo.
GRANT, WILLIAM H.....	1828 Jefferson Pl., Washington, D. C.
HERMANN, EDWARD A.....	2608 Lafayette ave., St. Louis, Mo.
HUDSON, JOHN R.....	320 Sansome st., Room 21, San Francisco, Cal.
JORDAN, EDWARD C.....	31½ Exchange st., Portland, Me.
KASTL, ALEXANDER E.....	The Brazos River Channel and Dock Co., Velasco, Tex.
LOW, EMILE.....	Engineer in charge Clinch Valley Div. N. & W. R. R., Estonoa, Va.
McMATH, ROBERT E.....	802 Odd Fellows Bldg., St. Louis, Mo.
MERRILL, GEORGE N.....	285 Main st Springfield, Mass.
MITCHELL, HENRY.....	Nantucket, Mass.
MOULTON, MACE.....	Manager and Engineer The R. F. Hawkins Iron Works, Springfield Mass.
OWENS, HENRY K.....	Room 29, Sullivan Block, Seattle, Wash.
PEW, ARTHUR.....	Talbotton, Ga.
PLAYLE, EDWARD F.....	49 Rush st., Chicago, Ill.
POST, LEVI W.....	102 Broadway, New York City.
POTT, JOHN N.....	Pottsville, Pa.
RIFFLE, FRANKLIN.....	President Oregon Bridge Co., Room 21, Ainsworth Block, Portland, Ore.
ROBINSON, ALBERT F.....	910 Monroe st., Topeka, Kans.
RUMBLE, WILLIAM.....	20 West 38th st., Bayonne, N. J.
SCHMIDT, MAX E.....	Lake Side Bldg., Room 54, Chicago, Ill.
SEARLES, WILLIAM H.....	41 West 12th st. New York City.
SONNE, OTTO.....	(Care S. Hagemen, U. S. Engineers' Office, Box 5346), Boston, Mass.
STEVENS, JOHN F.....	Lock Box 345, Snohomish, Wash.
TALCOTT, COOK.....	Electrical Exchange Bldg., 136 Liberty st., New York City.
THOMPSON, GAYLORD.....	340 Hudson st., Hoboken, N. J.
WAGNER, SAMUEL TOBIAS.....	Supt. Shops Phoenix Iron Co., Phoenixville, Pa.
WALKER, J. S.....	U. S. Engineer's office, Nashville, Tenn.
WEISKOPF, SAMUEL C.....	Engineer Keystone Bridge Co., 46 Wall st., New York City.
WISNER, GEORGE Y.....	39 W. Canfield ave., Detroit, Mich.
YEATMAN, CHARLES P.....	Rising Sun, Ind.

## JUNIORS.

ABBOT, ARTHUR V.....	(Care Ogden City Street Ry. Co.), Ogden, Utah,
BLODGETT, JOHN.....	Construction Dept. N. P. R. R., 614 Westminster st., St. Paul, Minn.
BRYAN, KENNERLY.....	Chief Engineer Hale Elevator Co., 187 La Salle st., Chicago, Ill.

BYERS, MORTON L.....	321 North Alabama st., Indianapolis, Ind.
FARLEY, JOHN M.....	Box 84, Syracuse, N. Y.
FOLWELL, A. P.....	92 Day st., Orange, N. J.
FOWLER, C. E.....	Banning, Cal.
HASBROUCK, CHARLES A.....	American Bridge Works, 40th st. and Stewart ave., Chicago, Ill.
KELLOGG, NORMAN B.....	(Care A. J. Swift, Chief Engineer D. & H. C. Co.), Albany, N. Y.
LATHAM, NORMAN S.....	589 Eleventh st., Brooklyn, N. Y.
LELAND, GEORGE H.....	65 Westminster st., Room 27, Providence, R. I.
NAYLOR, E. B.....	Assistant Engineer N. Y. C. & H. R. R., 138th St. Station, New York City.
PARSONS, SIDNEY A.....	(Care W. B. Fuller), Snohomish, Wash.
SHERWOOD, GEORGE W.....	Assistant Engineer M. V. & N. R. R., Malone, N. Y.
STAIR, WILLIAM H.....	U. S. Engineers' office, Fort Riley, Kans.
TAPPAN, ROGER.....	34 West Cedar st., Boston, Mass.
WADDELL, MONTGOMERY.....	The Waddell-Entz Electric Co., Bridgeport, Conn.

## FELLOWS.

COIT, EDWARD W.....	938 N. Second st. St. Louis, Mo.
FARREN, B. N.....	Montague City, Mass.

## DEATH.

FOGG, CHARLES E.....	Elected Member Oct. 16th, 1872; died April 26th, 1891
----------------------	---

## ADDITIONS TO LIBRARY AND MUSEUM.

### From American Institute of Mining Engineers:

A Compound Plunger Hydraulic Pump.  
Aerial Wire Ropeways.  
Chinese Silver Mining in Mongolia.  
Explosions from Unknown Causes.  
Fuel Gas and some of its Applications.  
Geological Notes on the Manganese Ore Deposit of Chimora, Va.  
Methods of Working and Surveying the Mines of the Longdale Iron Co., Va.  
Notes on Some of the Magnetites of South Western Virginia and the Contiguous Territory of North Carolina.  
On the Darby Process of Recarburization.  
Stone-Coal in the Lead Blast-Furnace.

### The Construction of Details for a Modern Lixiviation Plant.

The Development of American Blast-Furnaces with Special Reference to Large Yields.  
The Inspection of Materials of Construction in the United States.  
The Iron Ores of Virginia and their Development.  
The Physical and Chemical Equation of the Open Hearth Process.  
From Canadian Institute, Toronto, Canada:  
Transactions for 1896-91.  
Fourth Annual Report, 1890-91.  
Time Reckoning for the Twentieth Century.

- From Henry H. Carter, Superintendent of Streets, Boston, Mass.  
 Contracts and Specifications as follows:  
 For excavating and removing materials for roadways.  
 For teaming crushed stone.  
 For large paving blocks.  
 For repairing asphalt pavements.  
 For paving and regulating streets.  
 For furnishing paving brick, bank gravel and sand, cement, stone to the city crusher, spruce lumber, North River flagging, Newburyport sand and beach gravel.
- From Commissioners of State Reservation at Niagara.  
 Seventh Annual Report, October 1, 1889, to September 30, 1890.
- From W. F. Dennis, Williamsport, Md.  
 Canal Inter-oceanique de Panama—Rapport General par Lucien N. B. Wyse.
- From Engineering News, N. Y.  
 Parts Vols. IV, and V Engineering News.
- From Engineers' Society of Western Pennsylvania.  
 Proceedings Vol. VI.
- From James B. Francis, Lowell, Mass.  
 Sanitary Condition of the Water Supply of Lowell, Mass. Nov.-Dec., 1890.
- From Charles W. Gay, City Engineer, Lynn, Mass.  
 Annual Reports for 1888, 1889, 1890.
- From Institution of Civil Engineers, London, Eng.  
 Abstract of Papers in Foreign Transactions.  
 Authorities on the Steam Jacket.  
 Auxiliary Engines in connection with Modern Marine Engines.  
 Development of the Port of Swansea.  
 Influence of Heat on the Strength of Iron.  
 Machine Stoking.  
 Steam Engine Governors.  
 The Von Schmidt Dredge.
- From William Jackson, City Engineer, Boston, Mass.  
 Contracts and Specifications as follows:  
 Boston Water Works.  
 For cast-iron water pipes.  
 For three steam boilers for Mystic Pumping Station.  
 For three roads in Ashland and Hopkinton.  
 For cement for Dam No. 5.  
 For filling in Dam No. 5.
- City of Boston Improved Sewerage:  
 For section of the — intercepting sewer.  
 For cement.  
 For building section 10, Dorchester Sewer.  
 For section 3 of the outfall sewer.
- Federal Street Bridge:  
 For rebuilding Federal Street Bridge.  
 For two iron draws.
- Marine Park Filling:  
 For filling at Marine Park.
- North Harvard Street Bridge:  
 For widening the opening.
- The Parkway:  
 For grading at the Parkway.
- Arnold Arboretum:  
 For grading at the Arboretum.
- Essex Street Bridge:  
 For widening the opening.
- Back Bay Fens:  
 For building the Fen Bridge.
- East Boston Ferries:  
 For building ferry slip at East Boston.
- Extension L Street Bulkhead:  
 For building a bulkhead.
- Ferdinand Street Bridge:  
 For iron bridge in Ferdinand street.
- Department of Parks:  
 For railroad to Dam No. 5.
- From A. Wm. Jardine, Brisbane, Australia:  
 Five blue prints of Thursday Island Jetty Head.
- From J. Francis Le Baron, Mandarin, Fla.:  
 The Phosphate Fields of Florida.
- From Massachusetts Institute of Technology, Boston, Mass.:  
 A Technical Description of the Engineering Building of the Institute of Technology.
- From Reginald E. Middleton, London, England:  
 Seventh International Congress of Hygiene and Demography, August 10 to 17, 1891.
- From New York Meteorological Observatory, Central Park:  
 Annual Report for 1890.  
 Monthly Reports for 1891.
- From Robert A. Shailer, Chicago, Ill.:  
 Photograph of a Folding Bridge at Chicago, Ill.
- From Bucknell Smith, London, England:  
 A Treatise upon Wire; its Manufacture and Uses.
- From Smithsonian Institution, Washington, D. C.:  
 Report of United States National Museum for 1888.
- From McKee Swift, New Brunswick, N. J.:  
 Fac-simile reproduction of the farewell letter of Gen. J. G. Swift, Chief of Engineers, U. S. A., upon the occasion of his resignation, and of the general order from the Adjutant General's office on it.
- From U. S. Department of State:  
 Reports from the Consuls of the United States, No. 126, March, 1891.  
 Index to Vol. XXXIV.
- From U. S. War Department:  
 Army Register, March, 1891.
- From U. S. War Department—Chief of Engineers:  
 Contracts and specifications, as follows:  
 For building a pile and brush dam in San Joaquin River, Cal.  
 For cement for Kentucky River improvement.  
 For concrete superstructure of breakwater at Buffalo Harbor.  
 For extending Great Miami embankment.  
 For extension of breakwater at Buffalo Harbor.  
 For fishways at Great Falls of the Potomac.  
 For furnishing rip rap stone.  
 For ice piers in the Ohio River.  
 For improvements, as follows:  
 Aquia Creek, Va.; Chester River, Md.; Choptank River, Md.; entrance to Coos Bay, Oregon; Harbor at Delaware Breakwater; Onancock Harbor, Va.; Petaluma Creek, Cal.; Potomac River at Washington, D. C.; Warrior and Tombigbee Rivers, Wicomico River, Md.; Yellowstone National Park.  
 For mattress barges.  
 For removal of wreck in Rancocas River, N. J.  
 For stone and dredging at Flushing Bay.

# American Society of Civil Engineers.

---

## PROCEEDINGS.

---

Vol. XVII.—June, 1891.

---

### MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

---

#### OF THE SOCIETY.

JUNE 3D, 1891.—The Society met at 20 o'clock, Vice-President Fteley in the chair; F. Collingwood, Secretary. Ballots were canvassed and the following candidates declared elected: As Members: Bernard Frank Booker (elected Junior, October 7th, 1885), Topeka, Kans.; Thomas Moore Jackson, Morgantown, W. Va.; John Henry Morton, Denver, Colo.; George Washington Vaughn, Leavenworth, Kans. As Associate Members: John Francis Healy (elected Junior, January 2d, 1890), Birmingham, Ala.; Daniel Edward Moran, New York City; Thomas Kenward Thomson (elected Junior, October 3d, 1888), Kenova, W. Va.; Albert Lowry Webster (elected Junior, September 6th, 1882), New York City; James Knapp Wilkes, Danbury, Conn.

The Secretary announced the death, on May 8th, 1891, of Julius E. Hilgard, M. Am. Soc. C. E.

The Secretary presented for the examination of Members an album of views of the structures on the Muscle Shoals Canal, presented to the Society by Lieutenant-Colonel J. W. Barlow, Corps of Engineers, U. S. A.

Also two photographs of a novel folding bridge recently constructed in Chicago, presented by R. A. Shailer, M. Am. Soc. C. E.

Also the prints of drawings of Jetty Head, now being constructed at Port Kennedy, Thursday Island, Torres Straits, presented by A. William Jardine, M. Am. Soc. C. E.



A paper by Arthur D. Foote, M. Am. Soc. C. E., on "A Cheap Covered Reservoir," was read by the Secretary.

Discussions of papers on "Cement Testing," by William H. Grant and S. Bent Russell, Members Am. Soc. C. E., were presented.

The following resolution was adopted:

*Resolved*, That when this business meeting adjourns, it adjourns to meet on July 1st, at 8 P.M., to canvass the ballots then received, and that the meeting of June 17th be dispensed with.

### OF THE BOARD OF DIRECTION.

JUNE 19TH, 1891.—Financial matters were discussed. The resolution referred to the Board in reference to keeping the Society House open during the evenings (see Proceedings, Vol. XVII, p. 168) was considered, and the following resolution was adopted:

*Resolved*, That having fully considered the vote of the Society of April 1st, on opening the rooms of the Society every evening in the week, Sundays excepted, it is the sense of the Board of Direction that the not inconsiderable expense which such action would entail upon the Society, could be made to work greater advantages to the Society as a whole in other ways. Such as by endeavoring to keep in touch with our members by issuing to them circulars which will bring responses or incite them to think about the Society; by reissuing the circular relating to the record which is kept of engineers open to engagement; by endeavoring to improve the printed Transactions; by securing larger discussions to the papers; by the consideration of measures to increase the usefulness of the Society.

(Arrangements are now made, such that in the evening access can always be had to the Library by Members who especially desire to consult it.)

The subject of the appointment of four Members to represent the Society at the Seventh International Congress of Hygiene and Demography, to be held in London, August 10th-17th, 1891, was referred to Treasurer Bogart and Director Herschel.

The Finance Committee reported recommending that the Treasurer be requested to act as Auditor for the present year.

The Library Committee reported recommending that the Secretary be requested to act as Assistant Secretary and Librarian during the present year.

The Secretary reported the result of the canvass of bids for printing the *Transactions* and *Proceedings*, and the contract was awarded to the Evening Post Job Printing Office.

Applications were considered. Appropriations were made.

The following were elected: As Associates: Charles Whiting Bradley, New York City; Henry Wheelock King, Cleveland, Ohio. As Juniors: Edwin James Bengler, Reading, Pa.; Harvey Farrington, Croton-on-Hudson, N. Y.; Benjamin Wilder Guppy, Boston, Mass.

## CONVENTION OF 1891.

---

EVENING SESSION, THURSDAY, MAY 21ST. \*

---

The meeting was called to order by Past President William P. Shinn.

Mr. SHINN.—Ladies and gentlemen and Members of the American Society of Civil Engineers, through the courtesy of the President of the Society I have been asked to preside at this meeting, and in consequence of my well known inability to say “No,” I have consented. This is an honor that was totally unexpected, and I hope that you will excuse any shortcomings you may discover.

I have the pleasure of introducing to you Colonel Fort, the President of the Chamber of Commerce and the representative of our hosts in this city.

Colonel FORT.—Mr. President, ladies and gentlemen, in the absence of the Mayor of the City of Chattanooga, to whom this duty was entrusted, it becomes my duty, on behalf of the people of the City of Chattanooga and of its Chamber of Commerce, to welcome the American Society of Civil Engineers at their annual meeting on Lookout Mountain. Sacred history tells us that the first civil engineer was God, who found the earth without form and void and in six days' time moulded it into shape and form and turned it into space, with woman as the last of his works—woman the last and greatest, and most perfect of his gifts to mankind. But we find that even with the society of woman, man was but a savage, who lived by simply undertaking to live upon what was produced upon the soil of the earth, without his own labor. The first history that we have of mechanism and the founder of this great order of mechanism, is that of one whom you have heard called Noah, the father of mechanical engineering. The first project that was ever undertaken of any kind or description was the building of that great ark which, the record tells us, floated on the face of the water for forty days and forty nights exactly, and when the flood was over it left Noah's ark on Lookout Mountain—and here we are, by Noah's ark, and I don't know, gentlemen, how many different kinds of animals you have brought along with you. Noah is the father of this business. You cannot find any mechanism in any way or form, until Noah invented it. From the day of Adam to the day of Noah you don't find that the Father of all is going to trust anybody until he found that mechanic, Noah, and he trusted him, a man of whom we have only to say that he was of the number of those whom God was willing to preserve. There was not any man of Adam's race that God was willing to preserve, except a mechanic and those who belonged to his family. Mankind has advanced from a

---

\* The addresses here given were omitted from the report given in the May Proceedings.

condition of savage barbarism, and whatever has been done has been by mechanics. The difference between the natural man as he was produced, and a man of the highest grade of civilization is simply the difference in mechanism where that man exists. We, thank heaven, belong to the age of the appliances of mechanism.

Now, Chattanooga welcomes you for the reason that she is what she is and owes what she is simply to the brains of mechanics. Provisions have been made to enable you to know of the work and see and know of the undeveloped resources of this magnificent section of God's footstool where we have planned out our great future; what we are and what we hope to be. You, gentlemen, as mechanics, will ascertain what we have, teach us what to do, and how to develop here what we believe to be the center of the great manufacturing portion of the North American continent. Therefore, we welcome you as being among those who are our friends and well-wishers; it is to our interest to have the facts, and we believe it is to your interest to know what we have here. You cannot go over a section of country like this without taking away the impression that with our resources we have a grand future. We welcome you from that standpoint, that means you are our friends; we are your friends, and we extend to you the liberties of Noah's Ark, Lookout Mountain and Chattanooga.

The CHAIR.—Colonel Fort and ladies and gentlemen of Chattanooga, on behalf of the American Society of Civil Engineers, I desire to express my thanks and their thanks for the welcome which you have set forth to us, and to say to you that we are full of that species of gratitude which has been described as a lively appreciation of benefits to come. We have been told of the excursion that is coming off to-morrow down the Tennessee River, which is to be furnished us, I believe, by the people of Chattanooga, and, sir, we feel that your valuable explanation of our welcome is but a foretaste of what we shall get when we throw ourselves upon your mercy and submit to your guidance. Colonel Fort has carried us away back in history, much further than I dared to in my annual address last year, for which I thank him. We are always glad to know that we belong to an ancient lineage, we are glad to know that we belong to a lineage which has saved the race. Once more, on behalf of the American Society of Civil Engineers, I tender you our thanks for our welcome.

I believe there are some announcements to be made.

President OCTAVE CHANUTE.—Mr. Chairman, as Chairman of the Committee appointed this morning to report some method to nominate the Nominating Committee by the Convention, I wish to say informally that that Committee has had a meeting and has outlined a plan which it is now considering and which will be reported to the Convention at 10 o'clock Saturday morning. In order, however, that the members present shall know the direction in which the Committee has been consider-

ing the question and shall organize in advance, or shall bring up whatever objection there may be to the plan, I may say that it will consist in districting the country into seven districts containing nearly equal numbers of our members; the first district, New York City and 50 miles around, those who are called the Resident Members; the second, the remainder of the States of New York, New Jersey, Delaware, Canada, and other nations; the third district consists of the States of Maine, New Hampshire, Vermont, Massachusetts, Connecticut and Rhode Island; the fourth, Pennsylvania, Maryland, and the District of Columbia; the fifth, Michigan, Ohio, Indiana, Illinois and Wisconsin; the sixth, Minnesota, Iowa, Missouri, Kansas, Nebraska, North and South Dakota, Washington, Montana, Wyoming, Colorado, Utah, Idaho, Oregon, Nevada and California; the seventh, Virginia, West Virginia, North and South Carolina, Georgia, Alabama, Mississippi, Louisiana, Florida, Texas, Tennessee, Kentucky, Indian Territory, New Mexico, Arizona and Arkansas.

The Secretary has a map showing the districting, which will be posted on the blackboard for the inspection of members.

It will be proposed that the members present from the various districts shall confer with each other and nominate three members, or three persons to be voted for for the Nominating Committee from each district; that would make in the aggregate twenty-one persons so nominated, from whom it would be proposed to select the seven who are to serve, by written ballot, each member selecting from the list one person from each district and handing the ballot in; the seven persons receiving the highest number of votes to constitute the Nominating Committee. As I said before, this is only a tentative plan subject to revision, and it is announced only so that members may consider it.

The CHAIR.—The Chairman of the Committee on Arrangements, Mr. Whinery, desired me to announce further that there will be no expense whatever to the members, connected with the excursion; that the expedition will be free from the time we leave the hotel until we return.

It is about fourteen years since the American Society of Civil Engineers held a convention in the South. In 1877, we met in New Orleans, in 1880, we met in St. Louis, but that is so much on the border line it can scarcely be considered as in the South. We have met here, therefore, for the first time in fourteen years, and we have an opportunity to observe the wonderful growth of this land of which Chattanooga is the gate-way. We have here with us to-night Professor J. M. Safford, State Geologist of Tennessee, who will give us some remarks upon the topographical and geological aspects of this country. I have the honor of introducing Professor Safford.

Professor SAFFORD.\*—Mr. Chairman, ladies and gentlemen: I do not

---

\*Much of the interest of this address is lost from not having the charts and sections to refer to.



propose to deliver any formal discourse or lecture, but simply to make some few remarks upon the topography and geology of this vicinity and especially upon the Cumberland Mountain coal field of Tennessee. In describing the topography and geology of this part of Tennessee, take this very mountain that we are on as a type, the structure of Lookout Mountain illustrates quite a large portion of our southern coal field. As you will see from a chart of the strata, Lookout Mountain rests in a trough of silurian rocks; the point that we are on is the disappearing point of the synclinal axis. I have said that Lookout Mountain is 80 miles long, perhaps it was twice that length once; if so, it has been cut in two in the middle and the southern portion of it has been raised and eroded. The mountain is completely surrounded by limestone valleys, and as I have said, is a mountain resting in the silurian trough. The great cap rock is 100 to 250 feet thick; it is a hard sandstone rock and has kept the mountain from being washed away by resisting erosion, and hence the mountain as we have it. From the top of the mountain, down this far, we have the sandstone and shales, including the conglomerate of the coal fields; this is a very important part of our coal measures in Tennessee. Below the coal measures we have the carboniferous limestone; it is not a very heavy formation, in some places 1 200 feet in thickness, however. The lower part of this limestone is full of flint. It makes a trough in which the upper part of the mountain rests; below the flint is a bed of black slate, below this we have the iron ore bed, the Clinton formation. We have here three formations: the flint, the black slate and the iron ore formation, crowded together, and in all our ridges in East Tennessee these three or four formations are crowded together and generally form a sharp ridge—the flint on top, the black shale underneath and the iron formation and then the black shale again. These three formations come out on each side of Lookout Mountain, forming a sharp ridge parallel with the mountain. If you should notice carefully you will see a ridge running up on the left-hand side and one on the right side and then coming pretty near together as they run towards Chattanooga; these flank the mountain away down for 80 miles; we have here a great mountain and on each side of it a ridge in which the iron ore is found. Lookout, where we are now, is 1 378 feet above the Chattanooga and Nashville Railroad and about 2 154 feet above the level of the sea, possibly it is 2 200 feet above the sea.

Recapitulating, first, we have the coal measures, making the upper portion of the mountain, then the great carboniferous limestone, then, making a trough, these three formations, the flint, the black shale and the Clinton, in which we find the iron ore; below that the Trenton, and below that the mountain is flanked on each side by a ridge which carries these three formations; the flint resists erosion and that causes the preservation of these ridges; they are important because in them the iron ore is found. It is of interest to notice that in comparing this section



with a section in Pennsylvania we find a very great absence of the formations so prominent there; we have no Devonian in this country scarcely at all, it is hardly worth speaking of.

Waldron's Ridge and Raccoon Mountains are in the same range; their bulk has been badly cut by the Tennessee River, which winds here through Waldron's Ridge. Sequatchie Valley is a remarkable valley. Waldron Ridge has the same structure as Lookout Mountain, coal, carboniferous limestone, and a trough of three special formations, flint, black slate and iron ore formation. The valley to the west of us has been formed by an uplift; this valley has been denuded. If we go east of the great mountains of Central Carolina, we have a different country. We leave the coal measures behind us, but we have a great valley which is cut up by parallel ridges, separated by valleys. That construction is caused by the fact that all the rocks dip to the southward. As we go east we find the rocks all dipping; there is one range of hard rocks making ridges, and one of soft rocks making valleys; we have a grand series of ridges following out these, and all parallel with that trend northeast and southwest. Soon after leaving Lookout Mountain we come to a fault in the rocks, and then Missionary Ridge; then we have other ridges and valleys, and on to White Oak Mountain. At certain times of the day you can see three or four ridges between this mountain and White Oak Mountain; you can see they are all arranged in long rows, one after the other. In North Carolina the rocks all dip in the same way; the rocks are very hard, and so these mountains are very high, rocks all dipping to the southward and varying in character, you can see the varying topography; hard rocks and soft rocks succeeding each other, we have in the end this peculiar topography made up of parallel ridges and valleys.

Mr. Chairman, I believe I have nothing further to say.

The CHAIR.—We are certainly very much indebted to Professor Safford for this interesting description. Colonel Fort has kindly told us how this business happened to be done at all, and Professor Safford has told us how it was done and when it was done. Now, there is another gentleman here who can tell us something about what has been done since this region got here, and since Chattanooga became the center of the earth. I call upon the Honorable Xen. Wheeler to give us a few remarks upon the history of this vicinity.

Hon. X. WHEELER.—I do not propose to make any excuses or apologies, which I think are bad, but I do want to tell you how badly the President of the Society has treated you and your friends here, for I think that is due you.

A couple of weeks ago I met Mr. Whinery, and he told me that you were going to have a meeting on Lookout Mountain, and he desired me to make—not an address—but to make a talk to the people who were going to be here, in regard to the historical features of the place. Well,

I being a modest man, told him I did not think it was possible for me to do anything of that sort, that my engagements were such that I was unable to put any thoughts upon paper. Said he: "That is not what we want at all; we do not want a formal address, but you have a great big map down in Chattanooga displaying the topography of the country; we want you to take a stick and point out to these Yankees that are coming down here where Missionary Ridge and Lookout Mountain are, and the various points of interest that are connected with their history." Two or three days ago I observed in the paper that I was billed here for an address; now, I wish distinctly to say here that I am not going to make that address. I am inclined to believe that a good many of you are like me in this respect; I was a Northern man, brought up in Central Iowa, and had very little idea of the Central South. I remember away back in 1850, when we were a good deal younger than now, of reading an article in *Harper's Magazine* of a journey in the South in which Lookout Mountain was described, and when the war broke out, I think, with the exception of what I had seen in the magazine, I did not know there was such a place. The war has been a great eye-opener. A good many of us who had to tramp through many weary miles had their eyes opened to the fact that the South was a large country.

The early settlement of this country dates back a good ways, to the settlement, or rather to the admission of the State of Tennessee into the Union, and back of Revolutionary days. At the mouth of the Black and Little Tennessee Rivers was the first settlement of white men made in Tennessee, back in the days of George the II. It seems, at that time, the British having taken possession of Georgia, they took it into their heads they could have a settlement among the Cherokee Indians. There was a very large settlement of Indians there, and from Augusta the British came over and established a fort called Fort Loudon. This was in 1756, the first white settlement in Tennessee. After being there a couple of years quite a town had sprung up, which, in 1760, the Cherokees besieged. Finally the garrison capitulated, and the next morning the whole garrison, consisting of two hundred men, were massacred by the Indians. Captain Stewart and a few men only escaped. Another thing that makes this locality interesting, and I am speaking now back of the days of '61, I have said the Cherokee Nation was here; there was another town of Indians located here, and while the Cherokees generally were disposed to be friendly, yet during the Revolutionary war the British agents were inciting them continually to hostilities against the colonists; it was found that Hamilton, who was stationed at Detroit and was sending his emissaries all through the States, had incited these Indians, and they were going to take up arms against the settlers; he sent them a large amount of ammunition, guns, etc. This coming to the ears of Safford, Sharp and Robinson, and finding that their settlements were going to be destroyed by an Indian war, they collected seven

hundred and fifty men and went to the river. They built boats out of poplar trees, and embarking on them they floated down, and in the early morning landed at the mouth of the Chickamauga and laid waste the Chickamaugas and the Cherokees, destroying their town and the guns and ammunitions of war, and taking their horses and cattle they made good their retreat. The Indians, having nothing left, were obliged to give up the incursions that they had meditated and to make peace with Safford and Sharp.

A great many of you were at Chickamauga or the battle of Lookout Mountain or the battle of Missionary Ridge, all these are familiar to you, but I want to speak of one magnificent piece of strategy connected with this locality; that is, the mode in which the Army of the Cumberland was brought over from Middle Tennessee and planted upon the south bank of the Tennessee River. In 1863 Bragg and the Confederate army took position here at Chattanooga. They were separated from the Federal army in the first place by a large river; in the second place by Lookout Mountain, and then by the ridges of the Cumberland range; and Rosecrans was compelled to overcome all those obstacles, a wide river and three ranges of mountains. In that position of affairs he commenced to march for the south bank in the latter part of August, 1863. His army was scattered from Franklin on the north to Mechanicsville on the south. At that time Burnside was coming over into east Tennessee. In order to get in, Rosecrans must deceive Bragg as to the point of crossing. In the first place he sent Crittenden's corps over to the Sequatchie Valley, he moved the other corps, one into the Sequatchie Valley but below Crittenden's, and the other down to Bridgeport; but at the same time he sent Crittenden over to the southeast of Chattanooga and on the northern side of the Tennessee River. Bragg finally concluded that the place of crossing would be above Chattanooga; such was not the idea of Rosecrans, and by making feints continually and building fires, and making believe that a great many troops were on the north side, Bragg was firmly convinced that the crossing was to be above Chattanooga, but Rosecrans moved the army down, and it took up its march across Raccoon Mountain into the valley at the west of us. One corps came down to Trenton, and then went down to Valley Head and crossed at Valley Head. Thomas' corps came to Trenton, and crossed there, Crittenden's corps came to the mouth of the Sequatchie River, and the third corps were stationed upon the south bank of the Tennessee River. Crittenden's corps came around the point of the mountain; McCook's corps came down, and into the valley on the east side, but then, much to Rosecrans' surprise, he discovered that Bragg had only retreated to a very short distance; it was necessary, therefore, for McCook to return. Rosecrans sent word at once for him to return, and he did, passing over Raccoon Mountain and again passing to the eastward over the mountain, and the divisions concentrating here, the battle of Chicka-

mauga was fought. That, in my estimation, was one of the most brilliant pieces of strategy of which the annals of war gave us record. Opposed by an army of almost equal numbers, crossing three ranges of mountains, through a piece of difficult country, compelled to deceive his opponent as to the place of crossing, yet doing all this successfully. General Rosecrans was, I think, a very great military officer.

Twenty-five years ago Chattanooga was not a very pleasant sort of place. Lookout Mountain was here and Missionary Ridge, but the town itself was about the most dismal place in the world. It seems to some of us who have been here for the last quarter of a century, when we look back and see the changes, some of which have been brought about by the Yankees, that it has been very marvelous. I have spoken of what Chattanooga was, but it is left to you, ladies and gentlemen, to see what Chattanooga is to-day.

The CHAIR.—I am sure our venture into historical reminiscences has been a most interesting and very successful one, and I am equally sure that I but voice the feelings and opinions of our membership in saying that we give our most sincere thanks to Mr. Wheeler and to all these gentlemen who have extended this welcome and who have entertained us here so pleasantly to-night. As one or two of the expected speakers have eluded capture, I am afraid we will be called upon to declare this meeting adjourned *sine die*.

The SECRETARY.—Colonel King is here.

The CHAIR.—I am just informed that Colonel King is here. Colonel W. R. King, of the United States Engineers, will address us upon points of engineering interest.

Colonel W. R. KING.—Mr. President, ladies and gentlemen, I have been requested to tell you what I know of engineering about Chattanooga in the space of twenty minutes. I think there will be no trouble in doing it, but the question will be, what to do with the balance of the time. Colonel King then read a short written address, as follows:

#### ENGINEERING AROUND CHATTANOOGA.

When dame nature formed the site of Chattanooga she evidently thought she had given the engineers a hard nut to crack. She surrounded the place with rugged mountains, closely dovetailed together, tied the Tennessee River in a double bow knot, and filled it with reefs and rapids, and seemed to say to the engineers, "Now, let's see you get there!" But "they got there."

First came the Western and Atlantic Road, creeping down the Chickamauga Valley, tunneling through as well as winding among the mountains, and crossing the Chickamauga Creek again and again until it becomes doubtful which side the engineer really wanted to travel on. There were so many curves on this road and so many wooden bridges, that a tradition arose to the effect that the engineer received a royalty



on bridges (which were of his own invention) and double pay for laying out curves, and hence had used as many of both as possible. This will do as a joke—of a kind that engineers are quite used to—but to any one familiar with the character and services of Colonel Long, who was an officer of topographical engineers detailed on this special work, it is “a bald and unconvincing narrative.” The surveys made by Colonel Long of the upper Tennessee River and its tributaries, sixty years ago, covering many hundred miles of channel, were made under many difficulties, but they were models of neatness and accuracy unsurpassed unto this day.

In order to appreciate the engineering of those days we must recall the fact that there were very few “precedents” to guide the engineer in many of his difficult problems; and that few of the tools and facilities now in such general use were in existence. Railway building in the prairies of the great northwest was a very simple matter compared with the overcoming of natural obstacles to be met with on every hand in this rugged country.

In fact we are prone to overlook the labors of the engineer because of the very conveniences that he puts in our way. It was a very simple matter for our party to glide over the long bridge near Boyce. We saw nothing of Brother Whinery in the bottom of the coffer dams sounding for a foundation among the crevices in the rocks, as he was seen frequently ten or fifteen years ago, or as a little later he might have been seen watching for improperly constructed masonry, or still later clamoring over the highest members of the bridge itself, hunting for unriveted rivets or unbolted bolts. All this, however, was required to insure the safe and pleasant crossing of the river that we have enjoyed as a matter-of-course affair. But I have been switched off at Boyce instead of coming into Chattanooga.

The Nashville road was the next one to seek out this place, and its construction involved some nice engineering. A tunnel, a long bridge at Bridgeport, a very high trestle on a curve at Running Water, and a narrow shave around the foot of old Lookout are among the prominent features of this road. So rough is the country between here and Bridgeport that all attempts to get an independent line for the Memphis and Charleston road have thus far been unsuccessful. Not that the route was impracticable, but its cost was so great that it was thought better to continue to lease the right over the road already built. The Memphis and Charleston road has for its roadbed between Decatur and Tusculumbia one of the oldest railroads in the country.

It was built some sixty years ago as a portage between the navigable parts of the Tennessee River above and below Muscle Shoals, and was run by mule power.

The East Tennessee, Virginia and Georgia Railroad, following the great Appalachian Valley, meets with no very serious obstructions until



it reaches Mission Ridge, which it preferred to tunnel rather than go around as did the Western and Atlantic.

Coming now to the roads built since the war we have the Alabama Great Southern Road, or as it was first named, the Alabama and Chattanooga. This road had fewer natural obstacles to overcome, but it ran foul of much more troublesome snags in the way of lawsuits in great variety and virulence. So many delays occurred that the boys changed the name from A. & C. to "Wait and See." This road, like the Memphis and Charleston, found it so difficult to circumvent old Lookout that it leased the right of way over the Nashville road and so continues unto the present time.

And now comes the City of Cincinnati, reaching out for the railway focus at Chattanooga. For this purpose she decided to build a \$20 000-000 road, and this was carried out in the most thorough and substantial manner. Twenty-seven tunnels, many of them troublesome ones to drive, and many extensive viaducts, would have made this road a notable one without the great bridges over the Cumberland and Kentucky Rivers. But these interesting works of engineering are too familiar to require further comment, having been so recently inspected by most of the engineers here present.

Puck put a girdle round the earth in forty minutes, but Charley James didn't want quite the whole earth, so he put his girdle around Chattanooga. The engineering features of the Belt Road, I imagine, consist chiefly in harmonizing the many interests of railways and land owners so as to make the road a commercial possibility. The new Rome Railroad may be considered as the baby of this family of railroads, and like most babies, will doubtless be heard from in due season. But we must not omit the Prince of Denmark from our cast, and this brings us to the roads leading to this particular spot—this place where one can be as elevated as he pleases without help of the McKinley bill and without losing the vote of the Prohibition party.

One of the first things that struck the traveler just landed in Chattanooga in former times, after he had escaped from the cabmen and hotel drummers, was, "How can I get a view from Lookout?" This question was not easy to solve in those days and many were the disappointed tourists who, having no large bank accounts to draw upon, or who having come up to the mountain in an unauthorized manner, were turned back, were obliged to leave the city in a most undevotional frame of mind. When it was proposed to build an incline up the mountain many were the obstacles thrown in the way, and the knowing ones, who carry their information "on tap," gave frequent discouraging winks and ominous shakes of the head. This, however, is not an uncommon state of things, and in this particular case, the prime movers of the enterprise were too dull to appreciate the warning so kindly volunteered. The road was built, and in the brief space of five years another road was built, and a

third one has been commenced. There are, therefore, plenty of ways to get to the mountain now, and the wayfarer who fails to visit Lookout for want of transportation, should be properly marked and shipped C. O. D. by express.

The splendid system of electric roads in and around the city, and the splendid new bridge across the Tennessee River, all of which have grown up since my residence here ceased, are a credit to the city and to the engineers who built them. Nor should the work of the city engineer be overlooked. A long acquaintance with the present incumbent is all the guarantee I want that all pavements, sewers and other city engineering has been done with good judgment and fidelity.

There is one more engineering work in this vicinity, though not in the immediate neighborhood, that I might have forgotten but for the fact that I spent ten years of work in connection with it. I refer to the Tennessee River Improvement. In addition to the many rock reefs and other minor obstructions, the Tennessee River is divided into two sections, which were, until recently, entirely isolated from each other by the chain of reefs and rapids known as the Muscle Shoals. More than sixty years ago steps were taken to build a canal around this obstruction, and a canal was finally built, but it soon became useless from damages caused by heavy floods and for want of funds to make repairs it had to be abandoned. Some eighteen years ago an appropriation was made for rebuilding the canal and within the past year the work has been so far completed as to permit the passage of boats, though much work still remains to be done to give a satisfactory channel through this obstruction and to complete the removal of minor obstructions in other parts of the river.

Without going into details it may be stated that the Muscle Shoals improvement consists of 16 miles of canal and 12 miles of open channel work. The canal is from 80 to 120 feet wide and has eleven substantial locks of cut stone, 300 x 60 feet in the chamber, and with lifts varying from 5 to 13 feet. The lock walls placed end to end would make a wall 18 feet high, 7 feet thick and 2 miles long. Over 270 000 cubic yards of solid rock have been blasted from the bed of the river and canal trunk; more than a million cubic yards of earth excavated and half a million cubic yards of embankment built. Two thousand two hundred and seventy-eight tons of iron were used in the construction of the lock gates and aqueduct, and  $2\frac{1}{2}$  miles of heavy stone dams have been built.

If the engineers in and around Chattanooga have had great difficulties to overcome, they have also had greater incentives to noble effort. When Napoleon wished to prepare his army to meet the charges of the reckless Mamelukes in the Battle of the Pyramids, he pointed to those venerable piles and said: "Soldiers! forty centuries look down upon you from yonder heights." How much more stimulating should it be to

the Chattanooga to know that 40 000 centuries are looking down upon him from this grand old mountain. Swarthy Egyptians raised those monuments, but the Almighty raised this one. When the corner-stone of the first pyramid was laid old Lookout looked as old as he does to-day—a little wearing away of the rocks, an occasional fall of a section of cliff, trees replaced by other trees, but all else the same.

Since nothing was made in vain, what was the mission of this silent old mountain? Was it not to look out over the broad expanse of chaos for countless ages while the Tennessee River was slowly scooping out its rocky bed; to look out over the howling wilderness that was to constitute seven great States; to look out upon the tribes of savages who chased wild game through that wilderness; to look out for DeSoto, John Ross and other early explorers and emigrants; to look out for General Scott and his men when they came to remove the red men to other hunting grounds; to look out for the colored population; to look out for Joe Hooker, and Thomas, and Sherman and Grant; to look out for Wilder and Fort, Chamberlain and Dickinson, MacGowan and Connor, Temple and Shipp and scores of other "Yanks and Rebs" who saw good "reasons for making Chattanooga their homes." To look out for the harness of railroads that makes its summit the sanitarium of the invalid and the paradise of the tired worker of the valley.

This brings us up to date, but the development of this country will not stop here, and the old mountain can say with Tennyson's Brook, "Men may come and men may go, but I go on forever." We will never know what scenes it may yet look out upon. It is never safe to predict unless we allow ourselves plenty of margin. One thing in regard to the general subject of transportation; it can, I think, be safely predicted that the wonderful improvements that have been going on during the past few years, will continue for many years to come, and comparing railroad building and operating of thirty years ago with the iron bridges, seventy-pound rails and vestibuled trains of to-day, we may ask what will be the railway of the future? Recent trials on electric roads seem to indicate that enormous increase in rates of speed is possible, at least for mails and express packages, and it is not unlikely that we may soon see such matter traveling at 120 miles an hour or faster. Who can say what speed might be attained with facilities now available. Take, for example, continuous bearing rails weighing say 120 pounds per yard, and after being laid, let them be planed off by special machinery, so that the wearing surfaces are perfectly true; and have all the car wheels turned, as the driving wheels of locomotives are now. The locomotives must of course be perfectly balanced, and the entire train should be so constructed as to offer the least possible resistance to the air. I believe that such a road would be entirely possible and that the distance from New York to Chicago could be made in ten hours or less.

But to return to the more immediate neighborhood, who will under-

take to say what engineering work will be required here when this lively city has had a little more time to grow? Following the present law of increase the end of the century will see double its present population, or 100 000 people. How many more railroads, bridges, streets, pavements and sewers will be required even for the next ten years of growth? Most intelligent people believe in the future of Chattanooga, but occasionally a doubter is met with, as for example the somewhat "discouraged" tourist encountered some years ago by the genial and witty Eb James. "What is the valuation of this town?" asked the stranger, with the regulation number of hicks between words. When told that it was about \$2 000 000, the scoffer replied: "Well, if I had \$2 000 000 to invest I could buy me a city that would suit me a blamed sight better than Chattanooga." Had he been a little wiser in his generation he would have bought the city at that time and he would now be able to pay off the national debt.

On another occasion a friendly but misguided Pittsburger undertook to compliment Chattanooga by calling her the Pittsburgh of the South; but the tables were promptly turned by General Wilder, who expressed the hope that Pittsburgh would some day become the Chattanooga of the North.

On another occasion, in urging the construction of the Cincinnati Southern Railroad, it was stated that the locomotives would need no headlights on account of the numerous furnaces that would spring up along the line of the road and give sufficient light for operating the road. The prediction was all right so far as the number of furnaces was concerned, but the fashion of wasting the heat of the furnace by allowing the flames to escape has been changed so that headlights are still required on the locomotives.

In conclusion, allow me to thank the American Society of Civil Engineers and the Committee of Arrangements for a very delightful trip from New York to Chattanooga, and for the pleasure of attending this meeting.

As for Chattanooga, I will not say "may her shadow never grow less," but may her light always shine with increasing brightness, and may she become the great manufacturing center of a great nation—a country that has been described by a patriotic citizen as "bounded on the north by the aurora borealis, on the east by the procession of the equinoxes, on the south by unlimited space, and on the west by the day of judgment.

The CHAIR.—As the Secretary informs me there is nothing more in reserve, I will, in addition to the thanks extended to other gentlemen, extend the thanks of this meeting to Colonel King for his very interesting address, and declare this meeting adjourned.



## MEMOIRS OF DECEASED MEMBERS.

---

CHARLES E. FOGG, M. Am. Soc. C. E.\*

---

DIED APRIL 26TH, 1891.

---

Charles E. Fogg was born in South Scituate, Mass., in 1825, and in early life entered upon the studies in his native State, that fitted him for the profession of civil engineering, and which he devotedly followed to within a few weeks of his decease. Mr. Fogg's connection with the location and construction of railroads and water works in the United States and South America extended over a period of forty years. From 1854 to 1858 he was in Georgia and Alabama as principal assistant on the Southwestern, the Georgia and Florida, and the Mobile and Gerard Railroads (Virgil Powers being the chief engineer). 1859 to 1860 he was in charge of a division on the Tehauntepec Railroad. 1860 to 1862 he had charge of and built a short line of railroad in Cuba, between Baga and San Miguel. 1863 to 1864 he was assistant engineer on Charleston Water Works, Mass. 1865 to 1872 he was engaged as principal assistant on preliminary surveys, location and construction of the Poughkeepsie and Eastern and the Dutchess and Columbia Railroads, with location at Poughkeepsie, where he married. Upon the completion of these lines, in 1872, he was appointed chief engineer of the Brunswick and Albany Railroad of Georgia, the location and building of which he completed. 1873 to 1874 he was chief engineer of the Lee and Hudson and the Lee and New Haven Railroads in Massachusetts. He completed the location of both lines, but construction was suspended after having been partially finished. 1876 to 1878 he was in Brazil in connection with the building of the San Polo Water Works. He returned to the United States in the fall of 1878, after which he was employed as the chief engineer in building the Catskill Mountain Railroad, Poughkeepsie and Connecticut Railroad, in locating the Springfield division of the Hartford and Connecticut Western Railroad, and the Troy and New England Railroad. During the last five years of his life, owing to feeble health, he engaged but little in active engineering work.

He was elected a Member of the American Society of Civil Engineers October 16th, 1872, and was one of the Society Members who, with his wife, joined in the European excursion of American Engineers in 1889.

As a constructing engineer Mr. Fogg was clear and accurate in his plans and statements, was prolific in design, was thoroughly posted in engineering literature, and fully abreast of the times. His sense of per-

---

\*Committee to prepare memoir, Mr. P. P. Dickinson, M. Am. Soc. C. E.



sonal integrity was of the highest order, and his statements never doubted. He was naturally reserved, but loved the association of friends and family. He was full of sympathy for the unfortunate in his profession, and followed the scriptural injunction of not allowing the right hand to know what the left doeth.

He was strong in his friendship and most happy in his domestic relations, giving always to his wife all of the time not required in professional pursuits.

He was on his return from the South, where he had been spending the winter with his wife, hoping thereby to regain his health, and stopping at the home of one of his former assistant engineers in Wedgefield, Sumter County, S. C., H. R. Thomas, Esq., he passed peacefully to his final rest.

He was a pure, honest and God-fearing man, and leaves an example of a professional and upright life that all would do well to follow.

## LIST OF MEMBERS.

### ADDITIONS.

MEMBERS.		Date of Election.
BOOKER, BERNARD FRANK.....	Assistant Engineer Atchison, Topeka & Santa Fé R. R., Topeka, Kans.....	J. Oct. 7, 1885 M. June 3, 1891
JACKSON, THOMAS MOORE.....	Clarksburgh, W. Va.....	June 3, 1891
MORTON, JOHN HENRY.....	Engineer in charge Denver & Rio Grande R. R., Room 118, Cheesman Block, Denver, Colo....	June 3, 1891
VAUGHN, GEORGE WASHINGTON.....	Consulting Engineer Atchison, Topeka & Santa Fé R. R., Leavenworth, Kans.....	June 3, 1891

### ASSOCIATE MEMBERS.

HEALY, JOHN FRANCIS.....	Assistant Engineer Alabama Great Southern and New Orleans & Northeastern Rys., Birmingham, Ala...	J. Jan. 2, 1890 A.M. June 3, 1891
THOMSON, THOMAS KENNARD.....	Engineer Bridges Ohio Extension, Norfolk & Western R. R., Ke-nova, W. Va.....	J. Oct. 3, 1888 A.M. June 3, 1891

		Date of Election.
WEBSTER, ALBERT LOWRY.....	Civil and Sanitary Engineer, 107 Drexel Bldg., Wall and Broad sts., New York City.....	J. Sept. 6, 1882 A.M. June 3, 1891
WILKES, JAMES KNAPP.....	9 Pleasant st., Danbury Conn.....	
		June 3, 1891

## ASSOCIATES.

BRADLEY, CHARLES WHITING.....	General Superintendent West Shore R. R., West 42d st. ferry, New York City.....	June 19, 1891
GOODMAN, EDWARD HARRIS.....	President The Union Switch and Signal Co., Swissvale, Pa.....	June 4, 1891
KING, HARRY WHEELOCK.....	Secretary The King Iron Bridge and Manufg. Co., Cleveland, Ohio.....	June 19, 1891

## JUNIORS.

BEUGLER, EDWIN JAMES.....	Philadelphia & Reading R. R., Reading, Pa.....	June 19, 1891
FARRINGTON, HARVEY.....	Assistant Engineer New York Central & Hudson River R. R., Croton-on-Hudson, N. Y.....	June 19, 1891
GUPPY, BENJAMIN WILDER.....	Assistant Engineer Boston & Maine R. R., Boston, Mass.....	June 19, 1891
JEWETT, WILLIAM BRADFORD.....	Box 846, New Rochelle, N. Y.....	June 4, 1891
MILLER, CLIFFORD NEVILLE.....	604 Greenup st., Covington, Ky.....	June 4, 1891

## CHANGES AND CORRECTIONS.

## MEMBERS.

BARTLETT, WINTHROP.....	Chief Engineer St. Louis & Suburban Ry., Cons. Eng. Missouri R. R. and Dallas Cable Ry., 56 Turner's Bldg., St. Louis, Mo.
BLACKFORD, FRANCIS W.....	Civil Engineer and U. S. Deputy Mineral Surveyor, Lewisohn Bldg., Butte, Mont.
BOGART, JOHN.....	71 Broadway, New York City.
BOUSCAREN, G.....	Consulting Engineer, Mitchell Bldg., Cincinnati, Ohio.

BRACKENRIDGE, WILLIAM A.....	Division Engineer Niagara Falls Water Power Co., Niagara Falls, N. Y.
BRACKETT, DEXTER....	Assistant Engineer, City Engineer's office, City Hall, Boston, Mass.
BREITHAUP, WILLIAM H.....	Civil Engineer, 18 Broadway, New York City.
BUSH, H. D.....	President The Vogel Cable Cons. Co., 15 Broad st., New York City.
BYLLESBY, HENRY M.....	President Northwest Thomson-Houston Electric Co., 403 Sibley st., St. Paul, Minn.
CALKINS, FRANK A.....	Engineer Idaho Falls Canal and Irrigation Co., Idaho Falls, Idaho.
CARTER, HENRY H.....	Superintendent of Streets, City Hall, Boston, Mass.
CARTER, OBERLIN, M.....	Capt. Corps of Engrs. U. S. A., P. O. Drawer R, Savannah, Ga.
COOLEY, GEORGE W.....	642 Boston Block, Minneapolis, Minn.
CRAVEN, ALFRED.....	Division Engineer New Croton Aqueduct, Carmel, N. Y.
CROES, J. JAMES R.....	Consulting Engineer, 13 William st., New York City.
CURTIS, W. G.....	Assistant to General Manager and Engineer Main. Way Southern Pacific Co. (Pacific System), San Francisco, Cal.
DARLINGTON, FRANK G.....	Supt. Indianapolis Div. P., C., C. & St. L. Ry., Union Station, Indianapolis, Ind.
DE COURCY, BOLTON W.....	Engineer Harbor Line Comm., State of Washington, 342 Kelly st., Portland, Ore.
DERRICK, HENRY C.....	Houston, Halifax Co., Va.
DILLMAN, GEORGE L.....	Engineer Portland Cons. Co., Portland, Ore.
DORAN, FRANK C.....	Engineer and Gen. Roadmaster C. & W. I. R. R., and the Belt Ry. of Chicago, Chicago, Ill.
ELLIOTT, CHARLES G.....	Civil Engineer, Bloomington, Ill.
ENGLE, ROBERT L.....	Engineer in charge Louisville and Jeffersonville Bridge, 736 Westminster ave., Cincinnati, Ohio.
FARNHAM, ROSCOE E.....	Civil Engineer, 234 La Salle st., Room 60, Chicago, Ill.
FOOTE, ARTHUR D.....	Consulting Engineer Idaho Mining and Irrigation Co., Boise City, Idaho.
GOODRICH, WILBUR F.....	10 Gibbens st., Somerville, Mass.
GRAY, SAMUEL M.....	Consulting Engineer, Providence, R. I.
HAINES, HENRY S.....	Vice-President Plant System and Plant Investment Co., 12 West 23d st., New York City.

HARLOW, JAMES H.....	Engineer and Contractor, 108 Fourth ave., Pittsburgh, Pa.
HILBERT, HELIODORE J.....	Civil Engineer, 335 National ave., Milwau- kee, Wis.
HORTON, HORACE E.....	President Chicago Bridge and Iron Co., Tracy P. O., Chicago, Ill.
JACKSON, J. M.....	General Superintendent and Chief Engi- neer Baltimore and Eastern Shore R. R., Salisbury, Md.
KELLEY, HOWARD G.....	Resident Engineer and Supt. Bridges and Buildings, St. Louis Southwestern Ry., Texarkana, Tex.
KENNEDY, WILLIAM H.....	Portland, Ore.
KIMBALL, FRANCIS W.....	Railway Contractor, Austin, Minn.
KUICHLING, EMIL.....	Chief Engineer Water Works, 32 City Hall, Rochester, N. Y.
MARVIN, CHARLES EZRA.....	Vice-President and Gen. Man. North Ma- con Land Co., Macon, Ga.
McCLINTOCK, WILLIAM E.....	Civil Engineer, 23 Court st., Boston, Mass.
McLAIN, LOUIS R.....	124 Bay st., Savannah, Ga.
MILLER, HARRY IRVING.....	Superintendent Louisville Div. Penna. Lines West of Pittsburgh, Louisville, Ky.
MINTURN, ROWLAND R.....	Div. Superintendent C. M. & St. P. Ry., Babcock, Wis.
MYERS, CHARLES H.....	Civil Engineer, 63 Bleecker st., New York City.
MYERS, E. T. D.....	Richmond, Va.
NOYES, ELLIS B.....	Assistant Engineer in Charge N. Y. State Canals, Mechanicsville, N. Y.
OWENS, HENRY K.....	Chief Engineer Northwest Eng. and Cons. Co., Seattle, Wash.
PEARL, JAMES W.....	Engineer and Contractor Bridges and Buildings, Benton Harbor, Mich.
POWELL, CHARLES F.....	Capt. Corps Engineers U. S. A., Sioux City, Iowa.
PRIOR, CHARLES H.....	Civil Engineer, 516 New York Life Bldg., Minneapolis, Minn.
RICE, L. FREDERICK.....	Assistant Engineer Am. Bell Telephone Co., 125 Milk st., Boston, Mass.
ROBINSON, ALBERT F.....	(Care Purdy & Phillips), 1119 The Rookery, Chicago, Ill.
SAABYE, OSCAR.....	Consulting Engineer, 108 Jefferson st., Roanoke, Va.
SANDERSON, J. GARDNER.....	Civil Engineer, Scranton, Pa.
SCOTT, ARTHUR H.....	67 and 68 Moffat Block, Detroit, Mich.
SHANKLAND, E. C.....	Engineer of Construction to Burnham and Root, 1142 The Rookery, Chicago, Ill.

SHEDD, J. HERBERT.....	City Engineer, Providence, R. I.
SMITH, ISAAC A.....	Chief Engineer St. Louis Transfer Ry., East St. Louis Conn. Ry., Wiggin's Ferry Co., Room 31, Rep. Bldg., St. Louis, Mo.
STAATS, JOHN H.....	(R. P. & J. H. Staats, Contractors), 29 Broadway, New York City.
STAATS, ROBERT P.....	(R. P. & J. H. Staats, Contractors), 29 Broadway, New York City.
STRONG, CHARLES H.....	Civil Engineer and Contractor, 1789 Euclid ave., Cleveland, Ohio.
THOMSON, JOHN.....	Mechanical Engineer, 212 Temple Court Bldg., New York City.
TOMPKINS, JOHN A. B.....	Division Engineer Great Northern Line, Kalispell, Mont.
TOWLE, STEVENSON.....	Consulting Engineer Dept. Public Works, 31 Chamber st., New York City.
WALLACE, JOHN F.....	Engineer of Construction Illinois Central R. R., 78 Michigan ave., Chicago, Ill.
WILLIAMSON, WM. GARNETT.....	Assistant Engineer Elk River Div. M. S. Canal, Wheeler, Ala.

## ASSOCIATE MEMBERS.

JANNEY, WILLIAM D.....	Division Engineer N. & W. R. R., Ohio Extension, Ceredo, W. Va.
STARRETT, THEODORE.....	Engineer and Contractor, 374 The Rook- ery, Chicago, Ill.

## ASSOCIATES.

BELCHER, GEORGE C. W.....	Manufacturing Chemist, 121 Locust st., St. Louis, Mo.
HUNSIKER, MILLARD.....	Engineer of Tests Carnegie, Phipps & Co., Pittsburgh, Pa.
NICOLL, THOMAS W.....	Consulting Engineer Mobile Trans. Co., and M. J. & K. C. R. R., 64 St. Francis st., Mobile, Ala.
PHILLIPS, HENRY A.....	Room 409, Exchange Bldg., Boston, Mass.
POMEROY, LEWIS R.....	29 Broadway, New York City.

## JUNIORS.

ABBOTT, EDWARD L.....	Supt. Bridge Construction (care Union Bridge Co.), Alexandria, La.
ALLEN, THOMAS W.....	City Surveyor with Title Guarantee Co., 183 West 73d st., New York City.
BUTTS, EDWARD.....	City Engineer, 608 Exchange Bldg., Kan- sas City, Mo.



COLE, GEORGE W.....	Assistant Engineer Water Works Extension, Chain of Rocks, St. Louis, Mo.
CUSHING, WILLIAM C.....	Engineer Main. of Way Ind. Div. P., C. C. & St. L. Ry., Indianapolis, Ind.
DEANS, CHARLES HERBERT.....	Assistant Engineer SooySmith & Co., Fort White, Fla.
HAMILTON, MORRISON CLARK.....	Division Engineer N. Y., N. H. & H. R. R., Box 914, New Haven, Conn.
McCONNELL, EDWARD THOMAS.....	Engineer Main. of Way Peoria & Eastern Ry., Indianapolis, Ind.
McCORMICK, GEORGE KING.....	Assistant Engineer A. & St. L. R. R., Malone, N. Y.
MOULTHROP, GEORGE E.....	Civil and Mining Engineer, Butte, Mont.
NAYLOR, E. B.....	Assistant Engineer N. Y. C. & H. R. R. R., Room 48, Grand Central Station, New York City.
NYE, A. S., Jr.....	Leveler Croton Aqueduct, 144 Warburton ave., Yonkers, N. Y.
OSTRANDER, JOHN E.....	Division Engineer's Office N. Y. State Canals, Slingerlands, N. Y.
SEITZINGER, W. W.....	Civil Engineer, P. O. Box 509, Reading, Pa.
SHERWOOD, GEORGE W.....	Resident Engineer A. & St. L. R. R., Malone, N. Y.
SMITH, CHARLES H.....	Civil Engineer, 15 North st., Middletown, N. Y.
SMITH, MERITT H .....	Civil Engineer, Yonkers, N. Y.
TALLON, JOHN J.....	Assistant Engineer N. H. Co. Ry., 70 Seventh st., Hoboken, N. J.
TEMPLE, J. FRED.....	Chief Draftsman San Francisco Bridge Co., Seattle, Wash.
ZELLER, ALBERT H.....	Assistant Engineer Edgemoor Bridge Works, Wilmington, Del.

## FELLOWS.

ADAMS, EDWIN DEAN.....	17 Nassau st., New York City.
CHENEY, NATHANIEL.....	(Cheney & Hewlett Iron Works), 100 Rodney st., Brooklyn, N. Y.

## DEATHS.

HAWKSHAW, SIR JOHN....	Elected Honorary Member, Nov. 3d, 1880; died June 2d, 1891.
MACY, ARTHUR.....	Elected Junior, July 12th, 1877; Member, Dec. 2d, 1885; died April 14th, 1891.
MONROE, J. ALBERT.....	Elected Member Sept. 15th, 1869; died June 11th, 1891.

## BOOK NOTICES.

**A TREATIES UPON WIRE, ITS MANUFACTURE AND USES.**

By J. BUCKNALL SMITH, C. E., 8 x 10 inches, cloth, pp. xxii + 347; 93 illustrations. Synopsis of contents, list of illustrations, list of tables and full index. Offices of *Engineering* London, and John Wiley & Sons, New York, 1891.

As stated in the preface to the volume, "this treatise is intended to convey to the average reader intelligible and practicable descriptions of the history, manufacture and uses of various kinds of plain and worked wire as recurrent in, or applicable to, innumerable industries and purposes of daily service to all classes of the community." The author's intention is admirably carried out; and although he considers his treatise an elementary one, he has given a full and complete history of wire and of its manufacture and uses.

The chapters treat of Iron and Steel Wire. Copper, Bronze, Brass, Silver, etc., Wires, Wire Gauges, Electrical Conductors, Wire Ropes, Wire Netting, and Woven Fabrics, etc.

A very complete index adds value to the work.

**PANTOBIBLION: INTERNATIONAL BIBLIOGRAPHICAL REVIEW OF THE WORLD'S SCIENTIFIC LITERATURE.**

Editor, A. KERSHA, C. E., 6½ x 9¼ inches, paper, pp. 287. St. Petersburg, Fontanka, 64; D. Appleton & Co., New York, April 4th, 1891. Monthly. (Price, 24s. per year.)

A bibliography of the scientific publications of the world, intended to help scientific men to keep pace with the advancement of technics and engineering of every kind. Its scope is to contain a classified list of all the new books, published in all the principal languages, and dealing with scientific subjects; a series of critical articles on the leading publications of the world, and a review of periodical literature showing the contents of the magazines devoted to the applied sciences.

The present number, the first issued, contains about 1200 titles of new publications, 80 critical articles, and an index of the contents of 270 periodicals.

Almost all of the languages of Europe are represented in its pages.

**THE CLEANING AND SEWERAGE OF CITIES.**

By R. BAUMEISTER, Professor at the Technical Institute of Carlsruhe. Adapted from the German by J. M. GOODELL, Associate Editor *Engineering News*, with a preface by RUDOLPH HERING, 6 x 9¼ inches, cloth, pp. 277. *Engineering News* Publishing Co., New York, 1891. (Price, \$2.50.)

This book covers the whole subject of sewerage from grades, depths, outlets and alignments to flushing and ventilation and the purification of sewage from the German standpoint. Its general scope may be seen from some of the headings of its chapters, *e. g.*: Rain Water, Shape and Material of Sewers, Catch-Basins, Flushing, Ventilation, Pollution of Rivers, Irrigation, Quantity and Character of Refuse, Street Cleaning, Disinfectants, etc., etc.

Many illustrations of Catch-Basins, Manholes, Rain Pipe Traps, Sprinklers, Sweepers, etc., appear in the text and give practical value to the subjects treated.

**A GENERAL INDEX TO ENGINEERING NEWS AND AMERICAN RAILWAY JOURNAL.**

From April, 1874, to December 27th, 1890, inclusive, 6 x 9¼ inches, cloth, pp. 118. *Engineering News* Publishing Co., New York, 1891.

This index will supply a long-felt want of those who have had occasion to refer to the many valuable articles which have appeared in *Engineering News*. It includes the principal papers on engineering and kindred subjects which have been published in the columns of the periodical named, from the issue of the first number to the close of the past year.

Many articles of permanent technical value, which might otherwise escape attention, are made accessible to engineers and others interested in scientific matters, and much labor will be saved those who are often called upon for information on such subjects.

The publishers of other periodicals might well follow the example of the *Engineering News* and issue indexes of their papers.

## ADDITIONS TO LIBRARY AND MUSEUM.

---

- From Lt.-Col. J. W. Barlow, Corps of Engineers, U. S. A.:  
Memorial of the Opening to Navigation of the Muscle Shoals Canal, Tenn.
- From Onward Bates, C. E., Chicago, Ill.:  
Standard of 1891, Drawings 2847 to 2861. Chicago, Milwaukee and St. Paul Railway. 15 sheets.
- From Buffalo Water Commissioners:  
22d Annual Report for 1890.
- From L. E. Cooley, C. E., Chicago, Ill.:  
The Lakes and Gulf Waterway as related to the Chicago Sanitary Problem.
- From Frederick M. Crunden, St. Louis, Mo.:  
Annual Report of the St. Louis Public Library, 1889-90.
- From Engineering News:  
The Cleaning and Sewage of Cities.  
Index to Engineering News, 1874-90.
- From George E. Evans, City Engineer, Lowell, Mass.:  
18th Annual Report of Lowell Water Board for 1890.
- From C. G. Force, City Civil Engineer, Cleveland, Ohio:  
Annual Report of the City Civil Engineer for the year ending Dec. 31st, 1890.
- From Julian A. Hall, C. E., Washington, D. C.:  
Catalogue of the minerals and woods of the regions traversed by the lines of the Richmond and Danville Railroad.
- From George T. Hughes, Duluth, Minn.:  
4th Annual Report of the Board of Public Works for the year ending Feb. 28th, 1891.
- From Institution of Civil Engineers, London, Eng.:  
List of Members, June, 1891.
- From Wm. A. Ingraham, Secy. Geological Survey of Penn.:  
New General Map of the Anthracite Region of Pennsylvania.
- From A. Kersha, C. E., St. Petersburg, Russia:  
Pantobiblion; International Bibliographical Review.
- From Edward C. Kinney, C. E., Denver, Col.:  
8th Annual Report of the Chamber of Commerce and Board of Trade for 1890.
- From Michigan Mining School:  
Report of the Directors and Treasurer of the Michigan Mining School, Houghton, Mich. 1886-91.
- From Minister of Railways and Canals, Ottawa, Can.:  
Annual Report of the Minister of Railways and Canals for the year ending June 30th, 1890.
- From National Association of Builders, Boston, Mass.:  
Official Report of the 5th Annual Convention of the National Association of Builders Feb. 9th to 14th, 1890.
- From G. B. Nicholson, C. E., Cincinnati, Ohio:  
Over the Cincinnati Southern Railroad.
- From Joseph Nimmo, Jr., Washington, D. C.:  
The Practicability of the Proposed Nicaragua Canal, Oct., 1889. 8 copies.
- From the Register Publishing Co., Ann Arbor, Mich.:  
On the representation of the mean yearly temperature of a place as a function of its geographical longitude and latitude.
- From Hamilton Smith, Jr., London, Eng.:  
Report of the Directors of the El Callao Gold Mining Co. for the year 1890.
- From Smithsonian Institution, Washington, D. C.:  
Annual Report for 1889.
- From Technographic University of Illinois:  
The Technograph No. 5, 1890-91.
- From U. S. Department of State:  
Report from the Consuls of the United States, No. 127, April, 1891.
- From U. S. Interior Department, Patent Office:  
Alphabetical List of Patentees and Inventors for the quarter ending Dec. 31st, 1890.
- From U. S. Navy Department:  
Pilot Charts of North Atlantic Ocean. Ordnance Notes, No. 57.
- From U. S. War Department, Chief of Engineers:  
River and Harbor Bill, 1890.  
Appendix G of the Annual Report for 1888-90.
- From U. S. War Department, Chief Signal Officer:  
Report of the Chief Signal Office for 1890.
- From U. S. War Department, Ordnance Office:  
Annual Report of the Chief of Ordnance for 1888.

# American Society of Civil Engineers.

---

## PROCEEDINGS.

---

Vol. XVII.—July, 1891.

---

## MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

---

### OF THE SOCIETY.

JULY 1st, 1891.—Vice-President Fteley, Treasury Bogart and Secretary Collingwood canvassed the ballots for membership. The following were declared elected: As Members: Charles Clement Elwell, Philadelphia, Pa.; Henry Harrison Farnum, New York City; Richard Augustus Hale (elected Junior, February 6th, 1884), Boston, Mass.; William Ryan Hill, Syracuse, N. Y.; James Moreland Johnson, Louisville, Ky.; Phelps Johnson, Montreal, Canada; George Albert Kimball (elected Junior, May 12th, 1875), Boston, Mass.; Edmund French Van Hoesen, Rochester, N. Y. As Associate Members: Henry Clayton Allen, Syracuse, N. Y.; David Sylvanus Carll (elected Junior, March 7th, 1888), Georgetown, D. C.; Eugene Carroll (elected Junior, January 4th, 1888), Peoria, Ill.; George Hubbard Clapp, Pittsburg, Pa.; John Moyer Farley (elected Junior, December 5th, 1888), Fort Plain, N. Y.; Walter H. Gahagan (elected Junior, September 5th, 1888), Pine Bluff, Ark.; Daniel Webster Mead, Rockford, Ill.; Ralph Modjeski (elected Junior, December 1st, 1886), Athens, Pa.; Albert Howell Porter (elected Junior, July 4th, 1888), Niagara Falls, N. Y.; William Lee Sisson (elected Junior, June 4th, 1890), Williamsport, Md.; Edward Ernest Russell Tratman (elected Junior, April 7th, 1886), New York City; Paul Ludwig Wölfel (elected Junior, July 3d, 1889), Pencoyd, Pa.

## OF THE BOARD OF DIRECTION.

JULY 29TH, 1891.—The appointment of the Board of Censors to award the Norman Medal and of the Committee to award the Rowland Prize was considered.

Major James C. Post, E. Pontzen, Hamilton Smith, Jr., and George Earl Church, were appointed to represent the Society at the International Congress of Hygiene and Demography to be held in London, August 10th–17th, 1891. Applications were considered.

Mr. John Milton Goodell, of New York City, was elected as Associate.

## MEMOIRS OF DECEASED MEMBERS.

## THEODORE ALLEN, M. Am. Soc. C. E.\*

DIED, SEPTEMBER 18TH, 1890.

Theodore Allen was born at Hyde Park, N. Y., July 10th, 1840. He was the son of Theodore and Catherine Reed Allen, and a nephew of the late Horatio Allen, Past-President, Am. Soc. C. E. From early boyhood he had a strong predilection for mechanical and engineering pursuits, and always said that his career in life was the result of a visit paid to the Novelty Iron Works in New York, when he was a boy of ten years. After leaving school, he went to the Novelty Iron Works, of which establishment his uncles, Horatio and George J. Allen were then proprietors. Here he remained until the breaking out of the war, when he entered the United States Navy, as Third Assistant Engineer, in July, 1861. He was first appointed to the United States Gunboat *Seneca*, of the South Atlantic Squadron, and remained in active service for a year; on his return to New York, he was detailed for special duty in the Bureau for the Construction of Iron-clads, and with the exception of a short time of service on the *Dictator*, remained there till the close of the war, when he resigned as Second Assistant Engineer; he then entered into partnership with the late Alban C. Stimers, formerly Chief Engineer in the Navy, and remained with him for several years. After they dissolved partnership Mr. Allen remained in New York as Consulting Engineer. While

\* Memoir prepared by John Bogart, M. Am. Soc. C. E., from information kindly furnished by members of the family of Mr. Allen.



in business for himself, he built the iron ferry-boat *Erie*, for the Erie Railway Company, made plans for the New York Abattoir, and constructed an apparatus for obtaining borings by direct pressure for the New York Dock Company; a paper on the latter subject he read before the American Society of Civil Engineers.

In January, 1874, he left New York, and at the earnest solicitation of several prominent citizens of St. Louis, went to that city to start a new enterprise in the West: the building of iron boats and hulls for western rivers. In November, 1875, the Western Iron Boat Building Company was started, with Mr. Allen as superintendent and manager. They built several large snagboats, barges, etc., for the United States Government. In the fall of 1881, Mr. Allen and Mr. A. H. Blaisdell, M. Am. Soc. C. E., bought out the interest of the Western Iron Boat Building Company, and formed a partnership under the name of Allen & Blaisdell. Besides the boat business they built water towers, creosoting works, and bridges, and were equipped for all kinds of plate-iron work. The interest in iron boats for western rivers never met with the encouragement that Mr. Allen had expected, and the general depression in the iron trade in 1885 forced them to make an assignment in that year. While engaged in the iron boat business, he built between twenty and thirty boats, nearly all for the United States Government service. While in business with Mr. Blaisdell, they constructed the large ventilating shaft for the St. Louis Bridge and Tunnel Company. Mr. Allen remained in St. Louis as consulting engineer. In the summer of 1889, while in Texas superintending some water works, he contracted the dengue fever; this was followed in the winter by a severe attack of La Grippe, which developed latent trouble with the heart; he went north in hopes of re-establishing his health, but died on his way home at Lake Geneva, Wis., September 18th, 1890. He was buried at Hyde Park on the Hudson.

Mr. Allen was an expert in mechanical engineering and improved many of the details of practical machinery in the works with which he was connected. After he left New York and established himself in St. Louis he became deeply interested in the development of iron boat building for western rivers and devoted most of his time and thought to this industry.

Mr. Allen became a member of the American Society of Civil Engineers November 16th, 1870, and always felt a deep interest in its progress and welfare. In addition to the paper previously mentioned, he contributed one on "Apparatus for Obtaining Borings by Direct Pressure," another on "Iron Hulls for Western River Steamboats," both of which are published in the second volume of the *Transactions* of the Society.

**RICHARD POTTS, M. Am. Soc. C. E.\***

---

DIED, JULY 11TH, 1891.

---

Richard Potts was born near Baltimore, Md., September 4th, 1831, and was the eldest son of Jane Alexander and William Potts, and grandson of Judge Richard Potts, who was a member of the Constitutional Convention in 1787. He was educated at Ellicott City, and after a successful course in civil engineering was engaged in the construction of the "James River and Kanawha Canal," in charge of the late General Gwynn (one of the most important works of the time). He was engaged in the Sewerage Department at Louisville for some years in charge of construction, and moved to Chicago in 1855. Since 1863 he has been connected with the Sewerage Department of the Board of Public Works of the City of Chicago. The entire system was for many years under his charge, until the growth of the city required a division of the work into three separate departments.

Mr. Pott's accuracy, unremitting attention to, and marked capacity for his arduous duties, are well attested by the success of the sewerage system of this great phenomenal City of the Continent, the difficulties of which can only be appreciated by those who know the natural obstacles to be surmounted, and consider the rapid growth of the population to be provided for.

Mr. Potts was married in Chicago, to Miss Josephine Mead, February, 1863, and his private character as a son, husband and brother, are fully appreciated in the community where his life and works are well known, and where his steadfast integrity, kindness of heart and independence, commanded the respect of all his associates. Those who have served with him longest and known him best are foremost to express their warm esteem and cordial regrets for the honored comrade, who had always been the kind friend and adviser of his younger associates, and who had the true instincts of a Christian gentleman, was considerate to others and just to all.

He was elected a member of the American Society of Civil Engineers June 1st, 1870, and was also a member of the Western Society of Engineers.

He died on the 11th of July, 1891, after a long illness resulting from the "grippe."

---

\* Memoir prepared by Mr. Samuel G. Artingstall, M. Am. Soc. C. E.

## LIST OF MEMBERS.

## ADDITIONS.

## MEMBERS.

Date of Election.

ELWELL, CHARLES CLEMENT.....	Division Engineer Main. Way, Pittsburgh Divi- sion Baltimore and Ohio R. R., Pittsburgh, Pa..	July 1, 1891
HALE, RICHARD AUGUSTUS.....	Principal Assistant En- gineer Essex Com- pany, Lawrence, Mass. }	J. Feb. 6, 1884 M. July 1, 1891
JOHNSON, JAMES MORELAND.....	President Louisville Bridge and Iron Co., Louisville, Ky.....	July 1, 1891
JOHNSON, PHELPS.....	Chief Engineer Dominion Bridge Co. (Lt'd), Mon- treal, Canada.....	July 1, 1891
KIMBALL, GEORGE ALBERT.....	Exchange Bldg., Bos- ton, Mass.....	J. May 12, 1875 M. July 1, 1891

## ASSOCIATE MEMBERS.

CARLL, DAVID SYLVANUS.....	Assistant Engineer Washington and Georgetown R. R., Georgetown, D. C. }	J. March 7, 1888 A. M. July 1, 1891
FARLEY, JOHN MOYER.....	Assistant Engineer N. Y. State Canals, Box 84, Syracuse, N. Y. }	J. Dec. 5, 1888 A. M. July 1, 1891
MODJESKI, RALPH.....	Inspector Memphis Bridge Superstruc- ture, Athens, Pa... }	J. Dec. 1, 1886 A. M. July 1, 1891
PORTER, ALBERT HOWELL.....	Resident Engineer Cataract Construc- tion Co., Niagara Falls, N. Y..... }	J. July 4, 1888 A. M. July 1, 1891
SISSON, WILLIAM LEE.....	Assistant Engineer Baltimore and Ohio R. R., 219 E. Town- send st., Baltimore, Md..... }	J. June 4, 1890 A. M. July 1, 1891
TRATMAN, EDWARD ERNEST RUSSELL..	103 Tribune Bldg., New York City..... }	J. April 7, 1886 A. M. July 1, 1890
WOLFEL, PAUL LUDWIG.....	Assistant Chief En- gineer Pencoyd Iron Works, Pencoyd, Pa..... }	J. July 3, 1889 A. M. July 1, 1890

## ASSOCIATES.

COMER, HARRY.....	Superintendent Lehigh Valley Creosoting Works, Jersey City, N.J.	May 5, 1891
GOODELL, JOHN MILTON.....	108 E. 23d st., New York City.....	July 29, 1891

## CHANGES AND CORRECTIONS.

## MEMBERS.

BRINCKERHOFF, H. WALLER.....	Assistant Engineer Broadway Cable Road, 113 West 38th st., New York City.
CARPENTER, C. A.....	Engineer L. S. Div., L. S. & M. S. Ry., Cleveland, Ohio.
CLARKE, DAVID D.....	South Bend, Wash.
CONNETT, ALBERT N.....	Chief Engineer City Passenger Ry., Baltimore, Md.
COOPER, SAMUEL L.....	Assistant Engineer New York Finance Dept., Shonnard Terrace, Yonkers, N. Y.
COVODE, JAMES H.....	41 Sheldon st., Grand Rapids, Mich.
FELTON, HERBERT C.....	Superintendent Delaware River Ferry Co., Camden, N. J.
FORNEY, M. N.....	17 East 38th st., New York City.
FRAZIER, HARRY.....	Chief Engineer Chesapeake and Ohio Ry., Richmond, Va.
HALL, WILLIAM HAMMOND.....	Consulting Engineer, 79 Flood Bldg., San Francisco, Cal.
HANDY, EDWARD A.....	Chief Engineer L. S. & M. S. Ry., Cleveland, Ohio.
HARDING, HENRY.....	Civil and Hydraulic Engineer, Bridgeport, Conn.
HARRIS, WILLIAM P.....	Johnson City, Tenn.
HOLBROOK, HENRY R.....	Pueblo, Colo.
KIRTLAND, ALFRED P.....	Secretary and Treasurer Marble Hill Quarry Co., Cheswick, Pa.
KITTREDGE, GEORGE W.....	Chief Engineer C. C. C. & St. L. Ry., Indianapolis, Ind.
LONG, THOMAS J.....	(Care Union Bridge Co.), 33 Telephone Bldg., St. Louis, Mo.
MASON, ARTHUR J.....	Eighth and K sts., Galveston, Texas.
McCLURE, W. F.....	Chief Engineer Los Angeles Terminal Ry., Los Angeles, Cal.
McCULLOM, THOMAS C.....	Civil Engineer U. S. N., 12 Newberry st., Boston, Mass.
MILLS, CHARLES M.....	Pencoyd Bridge and Construction Co., Pencoyd, Pa.
MILLS, JAMES E.....	Quincy, Plumas Co., Cal.
MORTON, JOHN H.....	Engineer-in-Charge D. & R. G. R. R., 118 Chessman Block, Denver, Colo.
PARKER, C. O.....	310 Richardson Bldg., Chattanooga, Tenn.

RICE, GEORGE S.....	Chief Engineer Rapid Transit Commis- sion, 306 Exchange Bldg., Boston, Mass.
RIFFLE, ALBERT S.....	Secretary and Treasurer Ogden Bridge Co., Ainsworth Block, Portland, Ore.
RUGGLES, WILLIAM B.....	Chief Engineer C. P. & T. R. R., United Bank Bldg., Cincinnati, Ohio.
SAFFORD, EDWARD S.....	Sharon, Mass.
SMITH, GEORGE C.....	(Care E. J. Blake, Ch. Eng. C. B. & Q. R. R.), Chicago, Ill.
STANFORD, CHARLES W.....	Pier A, North River, New York City.
STANTON, ROBERT P.....	Coronado, Cal.
STEWART, JOHN M.....	322 West 58th street, New York City.
STUBBS, LINTON W.....	Resident Engineer V. S. & P. R. R., Vicksburg, Miss.
TOMPSON, G. M.....	Division Engineer Main. of Way, Western General Division N. & W. R. R., Roan- oke, Va.
TUCKER, HOOD.....	Engineer-in-Charge Harriman Coal and Iron Co., Harriman, Tenn.
WASHBURN, FRANK S.....	Purdy's Station, N. Y.
WHITFORD, O. F.....	Engineer's Office, Michigan Central Ry., Detroit, Mich.

## JUNIORS.

BEHRENS, WILLIAM F.....	Assistant Engineer Zuni Mountain Ry., P. O. Box 497, Albuquerque, N. M.
BOGGS, EDWARD M.....	Civil and Hydraulic Engineer, Banning, Cal.
EARL, GEORGE G.....	(Williamson and Earl), Americus, Ga.
FULLER, WILLIAM B.....	Engineer Everett Land Co., Snohomish, Wash.
HORTON, SANDFORD.....	(Care District Supt. Pullman's Palace Car Co.), Union Depot, St. Louis, Mo.
PANI, CAMILO E.....	Assistant Engineer Mexican Central R. R., Mexico, Mex.
PARSONS, SIDNEY A.....	Assistant Engineer Everett Land Co., Snohomish, Wash.
SMITH, PEMBERTON.....	Assistant Trainmaster N. Y. C. & H. R. R. R., Rochester, N. Y.
STAIR, WILLIAM H.....	U. S. Engineer's Office, 89 Euclid ave., Cleveland, Ohio.
STANFORD, H. R.....	(Union Bridge Co.), Memphis Bridge Co., Memphis, Tenn.
WILLIAMS, WILLIAM P.....	Engineer Electric Hoisting and Conveying Machine Co., P.O. Box 147, Cleveland, O.
YEATMAN, HENRY C.....	Coahuila Coal Co., San Felipe, Coahuila, Mexico.

## DEATH.

POTTS, RICHARD.....	Elected Member June 1st, 1870; died July 11th. 1891.
---------------------	---



## ADDITIONS TO LIBRARY AND MUSEUM.

From American Institute of Mining Engineers:

Aluminium Steel

The Precipitation of Metals from Hypo-sulphite Solutions.

The Refining of Sulphides obtained in the lixiviation process with Hypo-sulphite Solutions.

Notes on the Bessemer Process.

Experiments with the Imperatori Process at the Croton Magnetic Mine, New York.

The Mount Morgan Mine, Queensland.

The Alluvial Tin-Deposits of Siak, Sumatra.

Sinking through wet gravel and quicksand near Norway, Mich.

Massicks & Crooke's Patent Fire-Brick Hot-Blast Stoves.

Spirally-Welded Steel Tubes.

The First Iron Blast-Furnaces in America.

Sampling Ores without use of Machinery. Some Ontario Magnetites.

Stone-Coal in the Lead Blast-Furnace.

Proceedings of the Fifty-Ninth Meeting, Cleveland, Ohio, June, 1891.

From American Water Works Association:

Proceedings of the 11th Annual Meeting held in Philadelphia, 1891.

From Onward Bates, C. E., Chicago, Ill.:

Six mounted photographs of the bridge over the Mississippi River at Hastings, Minn., on the line of the C. M. and St. P. R. R.

From Boston Public Library:

Bulletin for July, 1891.

From Cherouny Printing and Publishing Co., N. Y.:

Music Hall, 57th st. and 7th ave.

From Director-General of the Railways in India:

Administration Report on the Railways in India, 1890-91.

From Department of Public Works, Chicago, Ill.:

15th Annual Report for 1890.

From Engineering Association of the South:

Publications Nos. 1, 2, 3.

List of Members.

From Aldrich J. Frank, Commr. of Public Works, Chicago, Ill.:

15th Annual Report of the Department of Public Works, 1890.

From Institution of Civil Engineers, London, Eng.:

Minutes of Proceedings, Vol. CIV.

Irrigation in Southern California.

Petroleum Storage Installations.

Sewerage of Dudley.

Counterbalancing of Locomotive Engines.

Construction of the new Nadrai Aqueduct, Ganges Canal.

Electric Mining Machinery.

Abstract of Papers in Foreign Transactions and Periodicals.

From W. F. Jennings, City Engineer, Toronto Can.:

Report of the City Engineer for 1890.

From W. J. Kirkaldy, C. E., London, Eng.:

Strength and Properties of Materials, with a description of the system of testing.

From Gabriel Leverich, C. E., Brooklyn, N. Y.:

Specifications for extension of cable driving plant, N. Y. and Brooklyn Bridge.

From Nova Scotian Institute of National Science.

Proceedings and Transactions, Vol. VII., Part IV., 1889-90.

From Public Library of Cincinnati:

Quarterly Bulletin, April, May, June, 1891.

From Royal Society of Canada:

Proceedings and Transactions, Vol. VIII.

From E. H. Stone, C. E., Simla, India:

Proceedings of the Committee of Locomotive and Carriage Superintendents for India, 1st Meeting at Lucknow.

From Charles F. Stowell, Bridge Eng., Albany, N. Y.:

Report of the Board of Railroad Commissioners of the State of New York on Strains in Railroad Bridges of the State.

From U. S. Coast and Geodetic Survey:

Report of the Superintendent for the year ending with June, 1889.

From U. S. Geological Survey, Department of the Interior:

Fourteen maps of the Survey.

From U. S. Department of State:

Reports from Consuls No. 128, May, 1891.

From U. S. Navy Department:

Pilot chart of the North Atlantic Ocean, July, 1891.

The Drift of Bottle Papers in the North Atlantic Ocean.

Annual Report of the Chief of the Bureau of Steam Engineering for 1890.

From U. S. Treasury Dept., Bureau of Statistics:

Statistical Abstract of the United States, 1890.

Report of the Internal Commerce of the United States for 1890.

From U. S. War Dept., Chief of Engineers:

Report of the Survey of the Savannah River

Report upon the establishment of harbors at Portage Lake, Mich.

Report upon the survey of the Altamaha River, Georgia.

# American Society of Civil Engineers.

---

## PROCEEDINGS.

---

Vol. XVII.—August, 1891.

---

NOTE.—There were no meetings held during the month of August.

---

## MEMOIRS OF DECEASED MEMBERS.

---

**FREDERIC GRAFF, Past President Am. Soc. C. E.\***

---

DIED MARCH 30TH, 1890.

---

Frederic Graff became the President of the American Society of Civil Engineers in January, 1885. His elevation to that distinguished office by the vote of the extended membership of this national society was accepted by him as the highest honor to which a civil engineer could aspire. His selection for that position and for the other positions of trust and confidence which he held, marked the appreciation by those with whom he was brought in contact, of the peculiar qualities with which Mr. Graff was endowed—strong common sense, excellent judgment and clearness of purpose, combined with great modesty and absence of desire for notoriety. Mr. Graff had been a member of the Society since May 7th, 1873, and took an active part in the presentation of American engineering at the Centennial Exhibition in Philadelphia in 1876, which was in charge of the Centennial Commission of the Society. The pumps and pipe service for the supply of water to the Exhibition Grounds were constructed under his direction.

Mr. Graff was born in Philadelphia, May 23d, 1817, and was the son of Frederic Graff and Judith Swyer. His great-grandfather, Jacob Graff, came to Philadelphia from Germany in 1741. His grandfather,

---

\* Memoir prepared by John Bogart, M. Am. Soc. C. E.

Jacob Graff, Jr., was a prosperous builder and lived in the house in Market, near 7th streets, in which Thomas Jefferson wrote the Declaration of Independence. Frederic Graff, Sr., the father of the subject of this memoir, was born in 1774, in that house. He is well known to the engineering profession as having been engaged in the construction of the city water-works of Philadelphia, first, of those in Center Square, of which he was appointed Superintendent in 1805, and afterwards as having designed and constructed the steam and water power service at Fairmount, and he continued to be the Chief Engineer of the water-works of Philadelphia until his death in 1847. Frederic Graff, his son, was made an Assistant Engineer in the Water Department in 1842, and Chief Engineer in 1847, at the death of his father. He continued to be Chief Engineer until 1856, when he resigned. In 1866, he was again elected Chief Engineer and continued to be such until 1872, then, and afterwards on several occasions, firmly declining re-election or nomination.

Mr. Graff was educated in Philadelphia, and it was the desire of his father that he should enter into mercantile pursuits. He was therefore placed, after his education had been finished, in a large hardware house, but this employment was not at all congenial, and after a short time his father concluded to permit the son to follow the profession he preferred and he entered upon the study of engineering, becoming an Assistant Engineer in the Water Department in April 6th, 1842. In 1860, Mr. Graff was connected with the Port Richmond Iron Works of Philadelphia, as manager, and continued in that position for three years. In 1863 he designed and built the pipe bridge across the Wissahickon, in which the water pipe is used as a compressive member. From 1873 to 1877, he was engaged in the development of water-works and water-works machinery, in connection with Mr. Henry R. Worthington. Mr. Graff acted as Consulting Engineer and as a member of various engineering boards, on many occasions, notably as one of an expert commission in 1886, for the examination of the tunnel and other works for the water supply of Washington. He also, in company with other engineers, made trials of the pumping engines at Cambridge, Mass.; Hartford, Conn.; Providence, R. I.; Brooklyn, N. Y., and various other places.

During Mr. Graff's charge of the water-works of Philadelphia, the Corinthian Avenue reservoir was built, the first turbine wheels were introduced at Fairmount, the department supplying the city with water was re-organized and the various district works combined with the principal city works; Fairmount dam was rebuilt, the Belmont reservoir on George's Hill was constructed, and the large reservoirs in the east park commenced; and the submerged main across the Schuylkill was laid.

Mr. Graff, in 1851, when Chief Engineer of the Water Department of Philadelphia, presented to the City Government the suggestion of establishing a park upon the Schuylkill River and prepared plans and

maps embodying the suggestion. This led to the purchase and improvement of the East Side park lands and subsequently developed into the great Fairmount park system of Philadelphia. He was a Park Commissioner during the period of the preparation and execution of the design for the park improvements, and as such commissioner visited other cities where park works were in progress.

Mr. Graff visited Europe twice, on the second occasion, in 1878, making a very extended tour.

Mr. Graff's connection with the water-works of his native city and the exhaustive nature of his duties while he was their chief engineer, together with the long residence in, and the association of his family with, the City of Philadelphia, confined his professional work within the limits mentioned above. What he accomplished in all the work which he did undertake shows conclusively that, had he had an aggressive nature and a desire for notoriety, he could easily have secured professional service and engagement of the largest character. Near his home and in association with his fellow citizens he was constantly busy in the active promotion of works for the advancement of art, of charity and of science. He was a member of the Franklin Institute from 1839 until his death; Manager six years and Vice-President three years, declining positively an election as President. He was an active member of the Committee on Exhibitions of that institute and in the great Electrical Exhibition of 1884 he gave up his whole summer to secure its success. He was one of the founders of the Zoological Society and Gardens of Philadelphia, a manager from its organization and its President since 1882. This is perhaps the most successful zoological society in this country, and its excellent business conduct is largely due to Mr. Graff's services. He was President of the Engineer's Club of Philadelphia in 1880. He was one of the founders of the Photographic Society and its President during six years. Mr. Graff was an excellent amateur photographer. He was also a member and officer of various other organizations.

Mr. Graff had great skill as a mechanic, and could do excellent work in carving in wood and stone.

The personal character of Mr. Graff was remarkably pure, the motives upon which all the actions of his life were based were of the highest possible nature. His habits were simple and healthful, his charities very large and very little known. He was a member of the Protestant Episcopal church and an earnest church worker. He was entrusted with the management of many important interests and never failed in his devotion to a trust. Knowing for years that he was liable to sudden death, he continued in the constant unselfish performance of the duties and works he had undertaken, exhibiting always a geniality and cheerfulness which made his society and companionship always a pleasure. These characteristics of his personal and social life were exhibited as

well in his professional works. Carefulness of design, thoroughness of execution, perfection of detail were of more importance to his mind than brilliancy of achievement or public notoriety.

In the councils of the American Society of Civil Engineers, as Member, as Director and as President, Mr. Graff's judgment and advice and suggestions were notable elements in the advance of the Society in strength and prosperity which occurred during his connection with it.

Mr. Graff married Elizabeth Mathieu, youngest daughter of Captain John Mathieu, of Philadelphia, who survives him. He left no children.

---

**JOHN HAWKSHAW, Hon. M. Am. Soc. C. E., M. Inst. C. E., F.R.S., F.G.I., Knight Commander of the Brazilian Order of the Rose.\***

---

DIED ON JUNE 2D, 1891.

---

John Hawkshaw, the son of a farmer near Bramhope, in Yorkshire, England, was born April 9th, 1811. Leaving school at the age of about fifteen years, he was engaged for some five years under Mr. Charles Fowler, on turnpike road construction, and then assisted Mr. Alexander Nimms on public works in Ireland, and on surveys for a projected railroad from Liverpool to the Humber along the Manchester, Bolton and Bury Canal. From 1832 to 1834, he was in charge of copper mines and the improvement of the River Aroa in Venezuela, until his health gave way and he returned to England, where he was engaged in the Liverpool Dock Yard, and later laid out the Leipsic and Dresden Railway under the direction of Mr. James Walker, President of the Inst. C. E. In 1836-38, he completed the railway of the Manchester, Bolton and Bury Canal Company. In 1838, he reported to the Great Western Railway Company adversely to the maintenance of the broad gauge. His views on this subject were maintained to the end of his life, and were frequently expressed publicly. A noticeable occasion of this was in 1872-73, when the Indian Government adopted the broad gauge for Indian railways. On the question of gradients for railways, his views were very pronounced also, and he had a severe contest with Stephenson in which he favored steeper gradients than had then been considered practicable. This independence of judgment was a marked characteristic of the man during his whole career. He examined thoroughly every subject which came before him, drew his own conclusions, and when his mind was once made up his conviction was incapable of alteration.

---

\* Memoir prepared by Mr. J. J. R. Croes, M. Am. Soc. C. E.



A simple enumeration of the enterprises on which Mr. Hawkshaw was consulted during the period of his active professional career, from 1838, when he became a member of the Institution of Civil Engineers, to 1888, when he retired from business, would be almost a complete catalogue of the great engineering works in which English capitalists were interested during the half century. For fifty-two years he was the Chief Engineer of the Lancashire and Yorkshire Railway System, and defended their bills before parliamentary committees, and opposed all rival corporations. As a witness before committees his reputation for directness of evidence, and avoidance of the snares of cross-examination, were unequalled. In all his work he was systematic. As an example of his economy of his own time, it is said that on a visit to Russia to inspect the route of the Riga and Dunaburg and Dunaburg and Witepsk railways, he posted day and night, arranging his stages so that portions of the line traversed by night when going in one direction were covered by daylight when returning. In the City of London, he constructed for the South Eastern Railway, with which he was connected for twenty years, the Charing Cross and Canon Street railways, which are said to be in proportion to length the most costly of railroad structures; comprising within three miles two large bridges over the Thames and two large terminal stations. The East London Railway passing beneath the London Docks and through the Thames Tunnel was constructed by him, and he was also one of the engineers for the Inner Circle Junction Railway. In foreign countries he was the Consulting Engineer for the Russian road above mentioned, for railways in Mauritius, in Jamaica, and in India. In the line of bridges, he constructed a number of extensive viaducts for railways with which he was connected, and also bridges over the Thames at Staines, a drawbridge at Kingston-on-Hull, the Londonderry Bridge in Ireland, the Nerbudda Bridge in India, nearly a mile long. In conjunction with Mr. W. H. Barlow, he completed the Clifton Suspension Bridge, the piers of which had been built by Brunel in 1843, but the roadway was not built until 1861, when Brunel's old Hungerford Bridge over the Thames was pulled down, and the chains used at Clifton.

In canal work Mr. Hawkshaw was for many years the Consulting Engineer on the Weaver Navigation in England; in 1863 he examined the Suez Canal project for the Viceroy of Egypt, and in 1879 he was invited by M. de Lesseps to attend the Panama Congress in Paris. His report to the Khedive on the Suez Canal was such that de Lesseps, in introducing Mr. Hawkshaw to his engineers at Port Said, said: "This is the gentleman to whom I owe the canal." In the Panama Canal matter he disagreed with de Lesseps, and left the Congress without voting. Of the proposals brought before the Congress he was most favorably impressed by that for the Nicaragua Route. From 1862 to 1876 he was the engineer of the Amsterdam Ship Canal. For the Viceroy of Egypt he

examined the first cataract of the Nile in 1864, and gave a plan for its canalization.

In harbor works his advice was often sought, not only in England, but also in Brazil, Holland, India and Buenos Ayres. In sewerage he constructed at Brighton an intercepting sewer 7 miles long, drained Cardiff, and reported on and gave designs for the sewerage of Dover and several other towns. In water supply he reported on many projects for the supply of cities in England and other countries. His opinion was largely trusted by the Government. In reference to the pollution of the Clyde and to the water supply of Dublin he was appointed sole Royal Commissioner, and he was a member of commissions appointed to examine into fortifications, and to consider wind pressure on railway structures. When the Government purchased the telegraph in the United Kingdom, he was entrusted to distribute the purchase money to the shareholders of the several companies.

In 1873 he was knighted by the Queen in consideration of his eminent public services. His constant professional employment left little time for literary or political engagements. In 1838 he published a small volume containing an account of his experience in Venezuela. He also contributed some papers to the Geological Society about the same time. He was a constant contributor, however, to the discussions in the Institution of Civil Engineers, and the index alone of subjects treated by him in such discussions prior to 1880 occupies six closely printed pages. On one occasion he offered himself as a candidate for election to the House of Commons, but was unsuccessful. In addition to his other duties, he was for twenty-six years an officer of the Engineer and Railway Transport Volunteers, of which corps he was the Lieut. Col. Commandant for the last twelve years of his life. In 1862 he was President of the Institution of Civil Engineers, and in 1875 of the British Association. In 1880 he was elected an honorary member of the American Society of Civil Engineers.

---

## LIST OF MEMBERS.

---

### ADDITIONS.

#### MEMBERS.

	Date of Election.
FARNUM, HENRY HARRISON..Engineer of Sewers, 141st st. and Third ave., New York City....	July 1, 1891

#### ASSOCIATE MEMBER.

MEAD, DANIEL WEBSTER....Engineer and General Manager Rockford Construction Co., Rockford, Ill.....	July 1, 1891
--	--------------

## JUNIORS.

BLUNT, ROBERT ALLAN.....	Office Director General of Rail- ways, Simla, Punjab, India....	June 4, 1891
SPIELMAN, JOHN GODFREY..	35 Broadway, Room 28, New York City.....	March 4, 1891
TUCKER, WILLIAM C.,.....	109 E. 16th st., New York City...	May 5, 1891

## CHANGES AND CORRECTIONS.

## MEMBERS.

BOLTON, CHANNING M.....	Chief Engineer Richmond & Danville R. R., Atlanta, Ga.
BRINCKERHOFF, H. WALLER.	371 Jefferson ave., Brooklyn, N. Y.
BURBANK, GEORGE B.....	Resident Consulting Engineer Cataract Con- struction Co., Niagara Falls, N. Y.
CLEMENT, FRANK H.....	Niagara Falls, N. Y.
FILLEY, HIEL H.....	Baird Bldg., Kansas City, Mo.
KASTL, ALEX. EDWARD.....	Chillicothe, Ill.
KEITH, GEORGE T.....	Box 1921, Montreal, Canada.
LOW, EMILE.....	Engineer-in-Charge Clinch Valley Division N. & W. R. R., Cedar Bluffs, Va.
MARR, GEORGE A.....	U. S. Assistant Engineer-in-Charge Portage Lake and Lake Superior Ship Canal, Houghton, Mich.
MARVIN, CHARLES E.....	Roadmaster Main Stem Central of Georgia Div. R. & D. R. R., Savannah, Ga.
NOYES, ELLIS B.....	Assistant Engineer-in-Charge New York State Canals, Stillwater, N. Y.
OLNEY, GEORGE R.....	Biltmore, N. C.
WILDER, FRANCIS M.....	230 Niagara st., Buffalo, N. Y.
WILLARD, JAMES E.....	Crescent Hill, Ky.

## ASSOCIATE MEMBERS.

ARENTZ, F. C. H.....	Engineer and Contractor, Box 422, Harrisburg, Pa.
SISSON, WILLIAM LEE.....	Assistant Engineer B. & O. R. R., 219 East Towns- end st., Baltimore, Md.
VON GEMMINGEN, SIGMUND..	Assistant Engineer C. & O. R. R., Nuttall, W. Va.

## JUNIORS.

FOUQUET, LOUIS D.....	Assistant Engineer N. Y., O. & W. R. R., Middle- town, N. Y.
FULLER, WILLIAM B.....	Engineer Everett Land Co., Snohomish, Wash.
GOSLING, EDGAR B.....	Mining and Civil Engineer-in-Charge of Erection Buildings for Suez Canal Co., Port Tewfik, Egypt.
SCARBOROUGH, FRANCIS W..	Engineer Maintenance of Way C. & O. R. R., Cin- cinnati, Ohio.
SMITH, MERRITT H.....	Civil Engineer, Yonkers, N. Y.

STANFORD, HOMER REED....Memphis Bridge Co., 2 Virginia ave., Memphis, Tenn.

TITUS, WALTON O.....P. O. Box 124, Eagle Pass, Texas.

## FELLOW.

TAYLOR, WILLIAM J.....General Manager Taylor Iron and Steel Co., High Bridge, N. J.

## ADDITIONS TO LIBRARY AND MUSEUM.

From A. P. Boller, Cons. Eng., New York:  
Report upon the sewerage system of the Township of East Grauge, N. J.

From Charles B. Brush, C.E., Hoboken, N. J.:  
Final report on the test of the pumping engine for the Artesian Water Company, Memphis, Tenn.

From Chamber of Commerce, Portland, Oregon:  
16th annual report for the year ending December 31, 1899.

From George Earl Church, C.E., London, Eng.:

Abstract of papers communicated to the Seventh International Congress of Hygiene and Demography. August 10-17, 1891.

"The Lancet," reports of the Seventh International Congress of Hygiene and Demography.

Foreign Committees and Delegates to the Seventh International Congress of Hygiene and Demography.

List of Members of the Seventh International Congress of Hygiene and Demography.

Papers read before the Seventh International Congress of Hygiene and Demography, as follows:

Opening address to the Engineering Section of the Seventh International Congress of Hygiene and Demography.

Sewage disposal with reference to river pollution and water supply.

L'assainissement des villes en Italie.

Sanitation in India.

French and English systems of sewerage. The removal of sewage after leaving buildings

The sanitation of a mining settlement.

Sewer ventilation.

Sewer and drain ventilation. Water supply.

De la distribution dans les villes de deux eaux de qualité différente par des canalisation distinctes.

Influence of ground water upon health.

The revolving purifier for treatment of potable waters by means of metallic iron.

Abkühlung des Wassers durch Anlage von Kühlschächten.

Die Typhus-Epidemie in Altona, 1891, und das filtrirte Flusswasser.

Refuse burning.

The present state of our knowledge concerning the self-purification of rivers. Eindringen von Unreinigkeiten in Druckwasserleitungen.

The water supply of maritime towns. On the cleansing of the streets and removal of household rubbish in German towns.

The refuse destructor. L'hygiène des chemins de fer et des voyageurs.

Municipal engineering.

Traitement des eaux d'égout par les procédés agricoles.

Application of a reservoir interceptor made on the type of Mouras' fosse.

Denmark, its medical organization, hygiene and demography.

From Lieut-Com. Richardson Clover, Washington, D. C.:

Report on uniform system for spelling foreign geographical names.

From Dyckerhoff & Söhne Amöneburg, Germany:

Protokoll der XIV general Versammlung des Vereins Deutscher Portland Cement Fabrikanten.

From East End Improvement Association, Cincinnati, Ohio:

Report of the Water-works Investigation Committee, July, 1891.

From Sandford Fleming, C.E., Toronto, Canada:

Railway Statistics of Canada for 1890.

From William Hamilton, C.E., Toronto, Canada:

Annual report of the Superintendent of the Toronto Water-works for 1890.

From Albert B. Hill, City Engineer, New Haven, Conn.:

Annual reports of the Department of the Board of Public Works, City of New Haven, for the year 1890.

From Institution of Civil Engineers, London, Eng.:

Effect of Temperature on the Strength of Railway Axles.

Florence and Piesole Electric Railway.

Generation and distribution of Electrical Energy.

Hydraulic Pumping Engines.

Railway Train Lighting.

Refined Petroleum in Bulk.

- Subterranean water in the Chalk Formation of the Upper Thames.  
Sulina Branch of the Danube.  
Temperature of Cylinders of Steam Engines.  
Transactions, Vol. CV.  
List of Members.
- From Gabriel Leverich, C.E., Brooklyn, N. Y.:  
Specifications and Proposals for N. Y. and Brooklyn Bridge.  
For Structural Iron Work.  
For Steam Boilers.
- From Liverpool Engineering Society:  
Transactions, Vol. XII.
- From Milliken Bros., N. Y.:  
Phoenix Column Construction as Adapted for Buildings.
- From Edw. P. North, Cons. Eng., N. Y.:  
Engineering News, Vols. XV, XVI, XVII, XVIII.
- From Bradley D. Pierce, Bridgeport, Conn.:  
Municipal Register of the City of Bridgeport, Conn., for 1886, 1887, 1888, 1889.
- From H. V. & H. W. Poor, N. Y.:  
Poor's Manual of Railroads for 1891.
- From Technical High School in Aix la Chapelle:  
Program for the Year 1891-92.
- From Technical High School in Hanover:  
Program for the Year 1891-92.
- From E. G. Russell Tratman, C.E., N. Y.:  
Report on the Substitution of Metal for Wood in Railroad Ties.
- From Irving S. Upson, Asst. Geological Survey of N. J.:  
Annual Report of the State Geologist for the Year 1890.
- From U. S. Naval Observatory:  
Washington Observations, 1886.
- From U. S. Treasury Department, Bureau of Statistics:  
Quarterly Report on Foreign Commerce, Immigration, etc., No. 3 Series, 1890-91.
- From U. S. War Dept., Chief of Engineers:  
Proposals and Specifications, as follows:  
For Construction of Pile Wharf at Fort Pine, Cal.  
For Construction of Spur Jetties near Fort Clinch, Fla.  
For Improving Cedar Bayou, Texas.  
For Improving Oakland Harbor, Cal.  
For Improving Apalachicola Bay, Fla.  
For Removal of the Wreck of the scow *Hannah Moore*.  
For Repairing and Constructing Wing Dams and Shore Protection in the Savannah River below Augusta, Ga.  
For Rip-rapping Levee at Shawneetown, Ill.  
For Stone for Memphis, Tenn.  
For Wire, Wire Strands, etc., for Memphis, Tenn.  
For Dredging in Virginia Channel in the Potomac River.  
For Dredging at Milwaukee Harbor, Wis.
- From Victoria Water Supply, Queensland, Aus.:  
River Gaugings, 1891.





# American Society of Civil Engineers.

---

## PROCEEDINGS.

---

Vol. XVII.—September, 1891.

---

### MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

---

#### OF THE SOCIETY.

SEPTEMBER 2D, 1891.—The Society met at 20 o'clock, Past Vice-President Thomas C. Clarke in the chair; F. Collingwood, Secretary. Ballots were canvassed and the following candidates declared elected: As Members: Arthur Beardsley (elected Associate, September 1st, 1875), Swarthmore, Pa.; Louis De Coppet Berg (elected Associate, June 6, 1888), New York City; Frank Edward Bissell (elected Junior, April 2d, 1884), Denver, Colo.; Carl Christian Adolph Both, Portland, Me.; Frederic Danforth, Gardiner, Me.; James Andrew Fairleigh, Chattanooga, Tenn.; Charles Cyrus King, West New Brighton, N. Y.; William Watson (elected Associate, March 1st, 1882), Boston, Mass. As Associate Members: Andrew Chase Cunningham, Pittsburgh, Pa.; Felix Freyhold, Washington, D. C.; Martin Luther Gardner, Jersey City, N. J.; William Sheldon Humphrey, Sedalia, Mo.; George Hunt Hutchinson, Pittsburgh, Pa.; Richard Calvin McCalla (elected Junior, July 2d, 1890), Tuscaloosa, Ala.; John Edwin Ostrander (elected Junior, May 2d, 1888), Albany, N. Y.; Thomas Adie Perkins, Ogden, Utah; Emrick Adolph Werner, Chicago, Ill.

The death of Charles E. Fogg, M. Am. Soc. C. E., on April 26th, 1891; the death of Sir John Hawkshaw, Hon. M. Am. Soc. C. E., on June 2d, 1891; the death of Arthur Macy, M. Am. Soc. C. E., on April 14th, 1891; the death of J. Albert Monroe, M. Am. Soc. C. E., on June 11th, 1891; and the death of Richard Potts, M. Am. Soc. C. E., on July 11th, 1891, were announced by the Secretary.

The action of the Board of Direction in reference to keeping the Society House open during the evening was read. (See Proceedings, Vol. XVII, page 216.)

The Secretary reported that at a meeting of the Board of Direction, held June 4th, the following were elected : As Juniors : Robert Allan Blunt, Simla, India ; William Bradford Jewett, New Rochelle, N. Y. ; Clifford Neville Miller, Covington, Ky.

The following papers were presented and read : "Concrete Beams Reinforced by Twisted Iron for Floor Construction," by Ernest L. Ransome. "Longitudinal *vs.* Cross Ties for Railway Tracks," by E. E. Russell Tratman, Assoc. M. Am. Soc. C. E. ; and discussed by Thomas C. Clarke, M. Am. Soc. C. E. "Some Experiments on the Transverse Breaking Strength of Plate Glass," by George W. Plympton, M. Am. Soc. C. E.

SEPTEMBER 16TH, 1891.—The Society met at 20 o'clock. Vice-President Fteley in the chair ; F. Collingwood, Secretary.

A paper by George Y. Wisner, M. Am. Soc. C. E., on "The Brazos River and Harbor Improvement," was read by the Secretary and discussed by Major O. H. Ernst and Robert E. McMath, Members Am. Soc. C. E.

A discussion of the paper by J. Foster Crowell, M. Am. Soc. C. E., on "Characteristics of the Ravine du Sud, and the Plan for Averting its Overflow," by William R. Hutton, M. Am. Soc. C. E., was read by the Secretary.

## OF THE BOARD OF DIRECTION.

SEPTEMBER 10TH, 1891.—Applications were considered. The subject of printing abstracts of papers of a technical character which appear in American and foreign periodicals was discussed and laid over for further consideration. A form of circular, to be issued at a later date to members in reference to the Engineering Congress in Chicago in 1893, was presented and adopted. Action taken as to members in arrears.

The following were elected : As Associates : John M. Diven, Elmira, N. Y. ; Herbert Stearns Squier Smith, Princeton, N. Y. As Juniors : James Chris. Anderson, Brooklyn, N. Y. ; Elmer Harry Beard, Reading, Pa. ; Walter Alexander Rogers, Helena, Mont. ; Samuel Storrow, North Yakima, Wash.

## LIST OF MEMBERS.

## ADDITIONS.

## MEMBERS.

Date of Election.

BEARDSLEY, ARTHUR.....	Professor of Engineering and Director of the Mechanic Arts, Swarthmore College, Swarthmore, Pa.....	} Assoc. Sept. 1, 1875 M. Sept. 2, 1891
BERG, LOUIS DE COPPET.....	Architect, 111 Broadway, New York City.....	
BISSELL, FRANK EDWARD.....	Superintendent N. M. Division Union Pacific Ry., Union Depot, Room 5, Denver, Colo.....	} J. April 2, 1884 M. Sept. 2, 1891
BOTH, CARL CHRISTIAN ADOLPH...	U. S. Engineers' office, Portland, Me.....	
DANFORTH, FREDERIC.....	Chief Engineer Portland & Runford Falls Ry., Gardiner, Me.....	Sept. 2, 1891
FITZHUGH, GEORGE DOWMAN.....	P. O. Box 402, Birmingham, Ala.....	May 6, 1891
HILL, WILLIAM RYAN.....	Chief Engineer Water Board, 8 Granger Block, Syracuse, N. Y.....	July 1, 1891
KING, CHARLES CYRUS.....	West New Brighton, Richmond Co., N. Y.....	Sept. 2, 1891
WATSON, WILLIAM.....	107 Marlborough st., Boston, Mass.....	} Assoc. Mar. 1, 1882 M. Sept. 2, 1891

## ASSOCIATE MEMBERS.

ALLEN, HENRY CLAYTON.....	City Engineer, Syracuse, N. Y.	July 1, 1891
CLAPP, GEORGE HUBBARD.....	95 Fifth ave., Pittsburgh, Pa.	July 1, 1891
CUNNINGHAM, ANDREW CHASE.....	(Care Carnegie, Phipps & Co.), Pittsburgh, Pa.....	Sept. 2, 1891
FREASE, HARRY.....	Chief Engineer Valley Ry., Cleveland, Ohio.....	May 6, 1891
FREYHOLD, FELIX.....	236 First st., Washington, D. C.....	Sept. 2, 1891
GAHAGAN, WALTER H.....	Union Bridge Co., Alexandria, La.	} J. Sept. 5, 1888 Assoc. M. July 1, 1891

GARDNER, MARTIN LUTHER.....	Assistant Engineer Maintenance of Way Dept., Pennsylvania R. R., Jersey City, N. J.....	Sept. 2, 1891
HUMPHREY, WILLIAM SHELDON....	Bridge Engineer Missouri, Kansas & Texas Ry., Se-dalia, Mo.....	Sept. 2, 1891
HUTCHINSON, GEORGE HUNT.....	Assistant Engineer Keystone Bridge Co., Pittsburgh, Pa.	Sept. 2, 1891
LAMB, RICHARD.....	1 Broadway, New York City..	May 6, 1891
MCCALLA, RICHARD CALVIN.....	U.S. Assistant Engineer, Black Warrior Improvement, Tuscaloosa, Ala.....	J. July 2, 1890 Assoc. M. Sep. 2, 1891
MORAN, DANIEL EDWARD.....	2 Nassau st., New York City..	June 3, 1891
OSTRANDER, JOHN EDWIN.....	Instructor of Civil Engineering, Lehigh University, South Bethlehem, Pa.....	J. May 2, 1888 Assoc. M. Sep. 2, 1891
WERNER, EMRICK ADOLPH.....	28 Rialto Bldg., Chicago, Ill..	Sept. 2, 1891

## ASSOCIATES.

DIVEN, JOHN M.....	Elmira, N. Y.....	Sept. 10, 1891
SMITH, HERBERT STEARNS SQUIER..	Princeton, N. J.....	Sept. 10, 1891

## JUNIORS.

ANDERSON, JAMES CHRIS.....	Hinsdale and Sutter aves., Brooklyn, N. Y.....	Sept. 10, 1891
STORROW, SAMUEL.....	North Yakima, Wash.....	Sept. 10, 1891

## CHANGES AND CORRECTIONS.

## MEMBERS.

BAILEY, GEORGE I.....	Engineer in charge, Frankfort, N. Y.	
BLAISDELL, ANTHONY H.....	Civil Engineer, Missouri River Commission, 1515 Lucas place, St. Louis, Mo.	
CURTIS, WALTER W.....	1105 Owings Bldg., Chicago, Ill.	
FERGUSON, JOHN W.....	26 Church st., Paterson, N. J.	
FRAZIER, JAMES L.....	Superintendent Southern Pacific Co., Wadsworth, Nevada.	
GOLDMARK, HENRY.....	(Care Construction Dept.), World's Columbian Exposition, 1143 The Rookery, Chicago, Ill.	
GRANT, EMERSON W.....	San Salvador Mine, Sierra Mojada, Mexico.	
HUGHES, WILLIAM M....	1034 The Rookery, Chicago, Ill.	
KIMBALL, GEORGE H.....	87 Adelbert st., Cleveland, Ohio.	



KINSLEY, THOMAS P.....	Williamsport, Md.
MOORE, CHARLES E.....	Santa Clara, Cal.
O'ROURKE, JOHN F.....	Engineer in charge of surveys, Rapid Transit Commission, 32 West 97th st., New York City.
PAINE, ARTHUR B.....	Chief Engineer Construction Dutchess County R. R., Poughkeepsie, N. Y.
SMITH, WILLIAM SOOY.....	1005 Owings Bldg., Chicago, Ill.
THOMPSON, BENJAMIN .....	125 Richardson Bldg., Chattanooga, Tenn.
TOMLINSON, ALFRED T.....	31 Sands st., Brooklyn, N. Y.
WALKER, WILLIAM W.....	Castile, N. Y.
WARD, CHARLES D.....	42 West 5th st., Oswego, N. Y.
WELLMAN, DAVID W.....	Mandan, North Dakota.
YEATMAN, CHARLES P.....	Shawneetown, Ill.

ASSOCIATES.

DAVIS, J. WOODBRIDGE.....	645 Madison ave., New York City.
HAMMOND, HENRY B.....	Glen Ridge, N. J.
LEWIS, FRANK C.....	Chief Engineer Columbus Bridge Co., Columbus, Ohio.

JUNIORS.

DAVIS, HENRY L.....	Wallingford, Conn.
FULLER, WILLIAM B .....	12 Ware ave., Wakefield, Mass.
KIBBE, AUG. S .....	69 First st., Niagara Falls, N. Y.
LYDON, WILLIAM A.....	115 Dearborn st., Room 71, Chicago, Ill.
PARSONS, SIDNEY A.....	Lowell, Wash.
RAASLOFF, HAROLD E. DE.....	Assistant Engineer Yokohama Harbor Works, 117 Bluff, Yokohama, Japan.
ROSENWEIG, ALFRED.....	I Bucareli No. 5, Mexico, Mex.

DEATH.

SCOTT, WILLIAM L .....	Elected Fellow July 7, 1870; died September 19, 1891.
------------------------	---

## ADDITIONS TO LIBRARY AND MUSEUM.

From American Institute of Mining Engineers:  
 American Blast Furnace Practice.  
 Aluminum in Steel Ingots.  
 Apparatus for the manipulation of Iron and Steel Plates during the process of finishing.  
 A Chinese System of Gold-Milling.  
 A Review of the Iron-mining Industry of New Jersey.  
 Cord-Wood in the Matting Blast-Furnace.  
 Electric Locomotives in German Mines.

Electricity in Welding and Metal Working.  
 Electricity in Mining, as applied by The Aspen Mining and Smelting Co.  
 Manganese in Cast-Iron.  
 Magnetites of Southwestern Virginia.  
 Practical Results in the Magnetic Concentration of Iron Ore.  
 Some Experiments in Blast Furnace Gases.  
 The Direct Determination of Aluminum in Iron and Steel.

- The Utilization of Anthracite Waste by Gasification in Producers.  
 The Use of Magnetic Concentrates in the Port Henry Blast-Furnaces.  
 Tandem Tanks for hoisting Water from Flooded Slopes.  
 The Manufacture of Liquid Sulphurous Acid in Upper Silesia.  
 The First Iron Blast-Furnaces in America.  
 International Standards of Analysis for Iron and Steel.
- From G. H. Benzenberg, City Engineer, Milwaukee:  
 Annual Report of the Board of Public Works, Milwaukee, Wis., for 1890.
- From G. Bouscaren, Consulting Engineer, Cincinnati:  
 Final Report of the Trustees of the Covington Reservoir.
- From Bureau of Statistics of Labor, Mass.:  
 Report of the Statistics of Labor, 1890.  
 Statistics of Manufactures, 1890.
- From R. H. Cousins, C. E., Austin, Texas:  
 The Mechanical Errors in the Common Theory of Flexure.
- From J. James R. Croes, Consulting Engineer N. Y.:  
 The Rivers at Johnstown, Pa. Report to the Board of Trade of the City of Johnstown.
- From Engineers' Society of Western Pennsylvania:  
 Slow Combustion Construction of Buildings.
- From Imperial High School in Berlin:  
 Programme for the School year 1891-2.
- From Institution of Civil Engineers, London:  
 Communication in Trains.  
 Fireproof Construction.  
 Construction of Piers and Breakwaters.  
 Lancashire and Ayrshire Railways.  
 Manufacture and Properties of Slag Cement.  
 Scarborough Improvement Works.  
 Skew-arch Course Traces.  
 Transmission and Distribution of Power.  
 Charter, By-Laws and List of Members.
- From Locomotive Superintendent of Tramways, New South Wales:  
 Report relating to the proposed Cable Tramway from King Street *via* William Street to Ocean Street, Sydney, N. S. W.  
 Report relating to the proposed Cable Tramway through George, Pitt and Harris Streets, Sydney, N. S. W.
- From Massachusetts Institute of Technology:  
 Abstract of Proceedings of the Society of Arts for 29th year, 1890-91.
- From Master Car Builders' Association:  
 Report of the Proceedings, 1891.
- From Hiram F. Mills, State Board of Health, Boston, Mass.:  
 Typhoid Fever in its relation to Water Supplies.
- From Mrs. James H. Morley, Windsor, N. Y.:  
 A Memorial Sketch of James Henry Morley.
- From John McGee, C. E., Buenos Ayres:  
 Librito del Campo.
- From H. V. and H. W. Poor, N. Y.:  
 Directory of Railway Officials, 1891.
- From Secretary for Mines, Victoria:  
 Annual Report of the Secretary for Mines for the year 1890.  
 Reports and Statistics of the Mining Department for the quarter ending 31st March, 1891.
- From Society of Engineers, London:  
 Transactions, 1890.
- From U. S. Department of State, Bureau of Statistics:  
 Reports from Consuls, Nos. 129, 130. June, July, 1891.  
 Beet Sugar Industry and Flax Cultivation in Foreign Countries.
- From U. S. Navy Department, Office of Naval Intelligence:  
 The Year's Naval Progress, July, 1891.
- From John Wiley & Sons, N. Y.:  
 The Transition Curve Field Book.
- From World's Columbian Exposition, Chicago, Ill.:  
 After Four Centuries (Copies in seven languages).  
 World's Fair Appropriations.  
 International Eisteddod.  
 Circulars of Information.  
 Maps and Plans of Buildings.

## BOOK NOTICES.

It is intended, in the future, to note the contents of such books relating to Engineering and allied sciences as may be sent by publishers for the use of the Society.  
 Publishers sending books will kindly mention price.

### THE TRANSITION-CURVE FIELD BOOK.

By CONWAY R. HOWARD, C. E. 4 x 6½ inches, Morocco, flap, pp. 109. John Wiley & Sons, New York, 1891.

Containing full instructions for adjusting and locating a curve nearly identical with the cubic parabola in transition between any circular railroad curve and tangent.

The aim of this Field-book, as stated in the preface, "is to furnish plain, practical rules and examples for guidance in adjusting and locating a curve nearly identical with the Cubic Parabola, as a Transition Curve in connecting circular curves with tangents."

One-half of the book is given to the solution of problems, and the remainder to tables of Radii of Degrees of Curve, Sines and Cosines, Tangents and Cotangents, Versed Sines and External Secants.

# American Society of Civil Engineers.

---

## PROCEEDINGS.

---

Vol. XVII.—October, 1891.

---

### MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

---

#### OF THE SOCIETY.

OCTOBER 7TH, 1891.—The Society met at 20 o'clock, Vice-President Fteley in the chair; F. Collingwood, Secretary. Ballots were canvassed and the following candidates declared elected: As Members: Caspar Wistar Haines (elected Junior, February 2, 1876), Guatemala, Central America; Charles Fred Beals Haskell, Wenatchee, Wash.; Alfred Allen Stuart, Newport, Ky. As Associate Members: Frederick William Abbot, Zumpango, Mexico; George Edwin Gifford, Cleveland, O.

The subject of confining the reading of papers and discussions to the first meeting of the month, and the second meeting to be more in the nature of a reception and for social intercourse among the attending members; or if papers be read that the meeting be called promptly at 20 o'clock and adjourn at 21 o'clock—was discussed, and the matter referred to the Board of Direction with the recommendation that the experiment be tried at the next meeting.

A paper by Joseph R. Oldham, N. A., on "Screw Steamship and Tow Barge Efficiency on the Northwestern Lakes of America," was read by the Secretary, and discussed by Messrs. Charles E. Emery, H. C. Felton, George S. Morison, John B. Atkinson, Charles H. Haswell, Robert H. Thurston and John A. Ockerson.

A series of views of various styles of steam vessels used in Western waters, presented by John A. Ockerson, M. Am. Soc. C. E., were exhibited.

A paper by Capt. O. M. Carter, M. Am. Soc. C. E., on "Some Recent Experiments with Dynamite on an Ocean Bar," was read by the Secre-

tary, and discussed by Messrs. L. M. Haupt, Charles B. Brush, F. Collingwood and S. Albert Reed.

The Secretary presented the following list of papers, which he stated he had received, advance copies of which would be forwarded to members who desired to discuss them:

"On the Hydraulics of the Hemlock Lake Conduit of the Rochester, N. Y., Water Works," by George W. Rafter, M. Am. Soc. C. E., to be read October 21st, 1891.

"On the Measures for Restricting the Use and Waste of Water, in Force in the City of Rochester, N. Y.," by George W. Rafter, M. Am. Soc. C. E., to be read October 21st, 1891.

"Stone Quarrying," by William L. Saunders, M. Am. Soc. C. E., to be read November 4th, 1891.

"The Experimental Determination of the Rolling Friction in Operating the Draw of the Thames River Bridge," &c., by A. P. Boller, Jr., and H. J. Schumacher, to be read November 18th, 1891.

"Some Disputed Points in Railway Bridge Designing," by J. A. L. Waddell, M. Am. Soc. C. E., to be read December 2d, 1891.

"The Red Rock Cantilever Bridge," by S. M. Rowe, S. W. Robinson and H. H. Quimby, Members Am. Soc. C. E., to be read December 16th, 1891.

"The Availability of the Cañons of the Colorado River of the West for Railway Purposes," by Robert B. Stanton, M. Am. Soc. C. E., to be read January 6th, 1892.

OCTOBER 21st, 1891.—The Society met at 20 o'clock, Director Edward P. North in the chair; F. Collingwood, Secretary. Action of the Board in reference to the meetings held on the third Wednesday of the month was announced.

A paper by George W. Rafter, M. Am. Soc. C. E., on "The Hydraulics of the Hemlock Lake Conduit of the Rochester Water Works," was read by the author, and discussed by Mr. Emil Kuichling. Written discussions by Messrs. John Thomson and E. Sherman Gould were presented.

#### OF THE BOARD OF DIRECTION.

OCTOBER 8TH, 1891.—Appropriations for the fourth quarter of 1891 were made. The following report of the Nominating Committee was presented:

YONKERS, N. Y., September 11th, 1891.

TO THE BOARD OF DIRECTION,

*American Society of Civil Engineers,*  
New York.

GENTLEMEN,—The Committee appointed at the last Annual Convention of the Society, held on Lookout Mountain, Chattanooga, Tenn., May 21st to 25th, 1891, to nominate officers for 1892, would respectfully submit the following report:

The Committee organized by electing P. F. Brendlinger Chairman, and immediately proceeded to the preparation of a circular-letter to be sent by the committeeman from each district to all members of the Society residing in his district, requesting an expression of the wishes of the membership as to the nominations. Replies were requested by August 20th, and the Committee was summoned to meet at Pittsburgh on September 10th, for the purpose of canvassing these replies and nominating a ticket.

The Committee met at the Monongahela House, Pittsburgh, on the 10th day of September. The following members were present: Past Presidents, W. P. Shinn and Max J. Becker, and the following representatives of districts:

1st District.....	P. F. Brendlinger.
3d    "       .....	Henry Manley.
4th    "       .....	William Metcalf.
5th    "       .....	W. E. Merrill.
7th    "       .....	O. H. Landreth.

Messrs. George S. Field, of the Second District, and W. S. Lincoln, of the Sixth District, were unable to attend, but each sent to the Chairman the votes received for the members of his district.

The chair was taken by Mr. P. F. Brendlinger and Colonel W. E. Merrill was appointed Secretary.

On examination of the votes received it was discovered that only about 7 per cent. of the members voted, and only about 3 per cent. voted a full ticket.

The following ticket was adopted:

*President.*—Mendes Cohen.

*Vice-Presidents for Two Years.*—Charles B. Brush and Samuel Whinery.

*Vice-Presidents for One Year.*—Samuel M. Gray and John MacLeod.

*Directors for Three Years.*—Leffert L. Buck, William P. Craighill, Desmond FitzGerald, Abraham Gottlieb, Benjamin M. Harrod and John Thomson.

*Directors for Two Years.*—Theodore N. Ely, Clemens Herschel, George W. McNulty, Robert Moore, P. Alexander Peterson and Robert L. Read.

*Directors for One Year.*—Alphonse Fteley, Estevan A. Fuertes, Albert B. Hill, Edmund T. D. Myers, James D. Schuyler and John G. Van Horne.

*Secretary.*—Francis Collingwood.

*Treasurer.*—John Bogart.

Respectfully submitted,

WILLIAM E. MERRILL,

*Secretary.*

P. F. BRENDLINGER,

*Chairman.*



The Constitutional provisions respecting the eligibility of candidates were then discussed, and

The following resolution was adopted:

*Resolved*, That whereas Alphonse Fteley, nominated by the Nominating Committee to serve as Director for one year, has declined such nomination, the Board of Direction, under Article 7, Clause 1 of the Revised Constitution, has substituted therefor the name of Charles H. Myers, and his name consequently appears on the list sent to members.

The following resolution was lost:

*Resolved*, That it is the sense of this Board, that Mr. Clemens Herschel is eligible as a candidate for the office of Director.

The following resolution was adopted:

*Resolved*, That whereas Clemens Herschel, nominated by the Nominating Committee to serve as Director for two years, is ineligible for such office, the Board of Direction, under Article 7, Clause 1 of the Revised Constitution, has substituted therefor the name of O. F. Nichols, and his name consequently appears on the list sent to members.

A committee of the Board was appointed to examine the letters received endorsing applicants for membership, and report at the next meeting of the Board.

Action was taken as to members in arrears.

The following Form No. 15 was adopted and ordered to be issued:

AMERICAN SOCIETY OF CIVIL ENGINEERS,  
NEW YORK, .....

DEAR SIR:

In consequence of your failure to comply with the requirements of the Constitution respecting the payment of dues to the Society, and no reason appearing for further delay, I am instructed by the Board of Direction to notify you, that in accordance with the provisions of Article IV, Section 8 of the Constitution quoted below, you have forfeited your connection with the Society.

Notice of this action will appear in the published Proceedings of the Society.

Respectfully,  
....., *Secretary*.

The following resolution was adopted:

*Resolved*, That in future meetings of the Society, on the third Wednesday of the month, the meeting will be called to order promptly at 20 o'clock, and reading and discussions of papers will continue to 21 o'clock, when a collation will be served and opportunity given for social intercourse.

Applications were considered. The following were elected: As Juniors: Charles Winslow Sherman, Ithaca, N. Y.; Taro Tsuji, Kansas City, Mo.

## MEMOIRS OF DECEASED MEMBERS.

---

JOHN MARSTON GOODWIN, M. Am. Soc. C. E.\*

---

DIED OCTOBER 27TH, 1891.

---

John Marston Goodwin, Member of the American Society of Civil Engineers (1872), was born in Roxbury, Mass., November 30th, 1833.

His father, Colonel J. M. Goodwin, was at that time Cashier of the People's Bank of Roxbury, and afterward Superintendent of the Massachusetts General Hospital—dying in office there; his mother was Emmeline C. (Philleo) Goodwin, who in later life was (as Mrs. C. K. Whipple) distinguished as the matron of several of the important charities in Boston, under the direction of Dr. S. G. Howe.

From these parents Mr. Goodwin inherited a careless indifference to the accumulation of property and a strong predilection for philanthropical enterprises, having been, all his life, more concerned about benefiting the community or the company which he was serving than himself. An early acquaintance with Thoreau and with his writings probably contributed something to increase this disinterestedness.

Mr. Goodwin was educated first in the Boston public schools, was then a student in Chauncey Hall and afterward was for a year or two at the Connecticut Literary Institute in Suffield; but before graduating, in 1849, he entered the engineer corps at St. Albans, Vt., then engaged in constructing a division of the Vermont and Canada Railroad, remaining until the road was completed; thence he went to the Champlain and St. Lawrence Railroad in Canada. In 1852 he became Assistant Engineer and Topographer on the New York and Boston Railroad, remaining until 1856, when he was appointed Principal Assistant of the Madison, Fond du Lac and Michigan Railroad. From 1857 to 1860 he was in the service of the La Crosse and Milwaukee Railroad, pushing the surveys of its branches, under various names, to Belle Plaine, Minn., and to Lake Superior. In 1861 he was engaged upon the Michigan Southern and Northern Indiana Railroad, stationed at Toledo, O.

In 1862 and 1863 Mr. Goodwin was in the office of the Assistant Secretary of War, P. H. Watson, at Washington, in charge of the papers of the Secret Service and Police Divisions; from 1863 to 1866, Engineer of the Mercer Iron and Coal Company, Pennsylvania; from 1866 to 1870, at Greenupsburg, Ky., as engineer of the Eastern Kentucky Railway; from 1870 to 1872 he was Consulting Engineer for Mr. P. H. Watson in the construction of the Jamestown and Franklin Railroad of Penn-

---

\* Memoir prepared by Charles Paine, Past President Am. Soc. C. E.

sylvania and of the Mahoning Coal Railroad of Ohio. When, soon after, Mr. Watson became President of the Erie Railway, he selected Mr. Goodwin for a confidential assistant; and he was attached to the President's office in New York during Mr. Watson's administration. From the Erie Mr. Goodwin went to the Sharpsville Railroad, of which he was for a long time, and until it was absorbed by the Baltimore and Ohio, the Chief Engineer.

His latest service as an engineer has been as a prominent and efficient member of the Pennsylvania Commission, to lay out a canal between Lake Erie and Pittsburgh. He made the surveys between Lake Erie and the Ohio River and prepared the larger part of the Commission's voluminous and very valuable report to the Legislature of Pennsylvania, which appeared this year; and he also read a paper upon this subject at the last annual convention of this Society at Chattanooga.

Mr. Goodwin was distinctively a man of talents, and capable of excelling in many ways, if he had chosen to devote himself to any one of them to the exclusion of the rest. He was a good inventor; he designed a valuable dump-car for coal, ore and gravel, which is in use; he patented a system of towage on canals by endless cable, which the writer believes to be the best yet proposed; he invented, but did not put into effect, a new rotary engine, besides numerous ingenious methods of doing work, such as every good engineer must originate to meet his own difficulties. He was an admirable critic and suggester of improvements to others, seeing something beyond or at hand which they had overlooked.

He was an elegant topographer and draughtsman, with a taste for ornamental letters and borders of his own design, sometimes quaint and humorous, at others beautiful. He sketched neatly and might have become an artist. He was fond of statistics and often corrected the official statisticians. He wrote charming verses, and no doubt was animated by the divine afflatus when he surrendered to its influence. Some verses are here cited which are autobiographical and introspective; they show a perfectly clear appreciation of his own mind and character.

[These extracts are from a poem of considerable length, never published, although printed for a few intimate friends, entitled]

#### NIGHT IN THE FOREST.

How still ! the great brands fall apart  
 With tinkling crepitations ;  
 I hear the beating of my heart,  
 The sleepers' respirations ;  
 And sounds mysterious, half defined,  
 That come like muffled thunder,  
 As if subterrene powers, combined,  
 Their bonds had rent asunder.

\* \* \* \*

My Pipe ! old friend, I prove once more  
 Thy gently soothing powers.  
 With thee of many nights before  
 Have I beguiled the hours.  
 Nights by dull Minnesota's stream,  
 'Neath cottonwoods gigantic ;  
 Where lone Itasca's waters gleam,  
 And by the broad Atlantic.  
 Recumbent thus, with half closed eyes,  
 Beatified, pacific,  
 Thoughts, memories, speculations rise,  
 Each thought of thoughts prolific.  
 My pulses, metronomic, time  
 Cadences for my fancies  
 To which they circle, linked with rhyme,  
 Through ever varying dances.

\* \* \* \*

How well my memory brings me back, my Best,  
 That evening when we from the Island's crest  
 Watched sunset's glories in the weltering West.  
 One band of crimson bars the level rays,  
 And in mid-air, a screen of amber haze,  
 A sheeny splendor, golden-moted, sways.  
 From cloud to cloud subsides the paling glow ;  
 With wings that stir the glassing calm below,  
 By twos and threes, the late gulls seaward go.  
 The spell that falls when summer daylight fades  
 All Nature thralls, and every sense pervades,  
 And quiet deepens with the deepening shades.  
 Again, my dearest, in the gleaming wake  
 That moonbeams on the restless waters make,  
 I see the wavelets rise and run and break.  
 The dazzling vista leads our seeking eyes  
 To where, when brightest, close beneath the skies,  
 The pathway ends, and all beyond denies—  
 Again, as when, with slowly dipping blade,  
 Our homeward voyage I lengthened and delayed,  
 I sing the song that once for thee I made.

“ What need of anchors on a shoreless sea ;  
 What need of sails where no sought harbor is ;  
 Our destination is where we may be,  
 Hence, too, we launched, and our sole port is this.

“ The center drifts attendant on our bark ;  
 Forever ringed with cloudless heaven, we move ;  
 Were love else dead, we bear within our ark  
 The germ of all the future's need of love.”

The faith of love and youth ! I said, " with me  
 Thy life shall never know a want or care."  
 My chiefest help ! Long since I learned of thee  
 Those truths they teach who best know how to bear.  
 My days are used as are th' accustomed beads  
 In his loose hands whose muttered prayers are tasks ;  
 Such use they ever make, whose glorious deeds  
 Wait those rare times that indecision asks.

Alas ! what sighs. Too long a watch I keep,  
 And nameless signs of coming morning tell—  
 The morrow's tramp demands that I should sleep,  
 So, God protect us all ! and mine, farewell.

Considering his early separation from the schools, Mr. Goodwin became unusually well informed in general literature and in science ; in these directions his vigorous imagination enabled him often to apprehend more than was stated by his author.

All these gifts made him a charming associate, who will be ever remembered by his family and friends as one of the most brilliantly endowed of all whom they have known.

Mr. Goodwin was twice married ; his first wife having died early, leaving no children. By his union with Helen Van Pelt, of Toledo, O., in 1863, who survives him, he had two sons and two daughters, now living.

He died at his home in Sharpville, Mercer County, Pa., on October 27th, 1891, and was buried beside his kindred in Plymouth, Mass., in view of the ocean, which he loved with an unquenchable passion, although the circumstances of his life had compelled him to live inland, and overlooking the beloved play-ground of his youth, of which he sang :

" And that dear island in the sheltering bay  
 Where once the pilgrim's sea-worn shallop lay !  
 Blest spot ! by nature and by fortune blest ;  
 Ever, as then, the happy finder's rest ;  
 My constant lure from whatsoever quest ! "

---

## LIST OF MEMBERS.

---

### ADDITIONS.

#### MEMBERS.

	Date of Election.
GILES, ROBERT.....Engineer Dept. Atchison, To- peka & Santa Fé R. R., To- peka, Kans.....	May 6, 1891



	Date of Election.
STUART, ALFRED ALLEN.....Assistant to Chief Engineer New Union Pass. Station, Care Terminal Railroad Assocn., St. Louis, Mo.....	Oct. 7, 1891
VAN HOESEN, EDMUND FRENCH.....Resident Engineer New York Central & Hudson River R. R., Rochester, N. Y.....	July 1, 1891

## ASSOCIATE MEMBER.

GIFFORD, GEORGE EDWIN.....King Iron Bridge and Mfg. Co., Cleveland, Ohio.....	Oct. 7, 1891
--	--------------

## JUNIORS.

SHERMAN, CHARLES WINSLOW...9 E. Buffalo st., Ithaca, N. Y..	Oct. 8, 1891
TSUJI, TARO.....313 Keith and Perry Bldg., Kansas City, Mo.....	Oct. 8, 1891

## CHANGES AND CORRECTIONS.

## MEMBERS.

ANDREWS, JOHN W.....	306 Thayer Bldg., Kansas City, Mo.
BEAHAN, WILLARD.....	(Care Anderson & Barr), Cor. Greene and Classon aves., Brooklyn, N. Y.
BREEN, HOWARD.....	75 Major Block, Chicago, Ill.
GREENE, EDWARD A.....	317 N. Washington st., Alexandria, Va.
GREINER, JOHN E.....	(Care Cofrode & Saylor), Pottstown, Pa.
HOUSTON, JOHN.....	Arlington, N. J.
JACKMAN, HOWARD H.....	715 Western ave., Topeka, Kans.
JENNINGS, HENRY C.....	611 People's Bank Bldg., Denver, Colo.
JUENGST, HENRY F.....	(Care St. Joseph Water Co.), St. Joseph, Mo.
LEDERLE, GEORGE A.....	(Care George S. Morison), The Rookery, Chicago, Ill.
LOW, GORHAM P.....	212 Sacramento st., San Francisco, Cal.
MITCHELL, HENRY.....	18 Hawthorn st., Roxbury, Mass.
NEARING, FRANK.....	328 Central Bldg., New York City.
PEW, ARTHUR.....	Engineer Seaboard Co., Savannah, Ga.
ROCKWELL, SAMUEL.....	Engineer M. S. Div. Lake Shore and Michigan Southern Ry., Toledo, O.
SMITH, MILLER A.....	Chief Engineer Signa Iron Co., Santiago, Cuba.
STEPHENS, CLINTON F.....	2718 Mills st., St. Louis, Mo.
STEVENS, HORACE E.....	Lakeview, Minn.
UNTHANK, ACHILLES W.....	1201 Buena Vista st., Los Angeles, Cal.
WILLIAMSON, F. STUART.....	53 State st., Boston, Mass.
WISNER, GEORGE Y.....	Port Eads, La.

## ASSOCIATE MEMBERS.

- PENNYPACKER, LEVIS P. .... Chief Engineer Compañia de Alumbrado Electrico, San Salvador, Central America.  
 WILKES, JAMES K. .... City Engineer, Danbury, Conn.

## JUNIORS.

- BOGART, JAMES P. .... 291 Washington ave., Bridgeport, Conn.  
 CHAPIN, LOOMIS E. .... City Engineer, Canton, O.  
 FULLER, WILLIAM B. .... 152 Linden ave., Walden, Mass.  
 NYE, ALGERNON S., Jr. .... Brewster, N. Y.  
 PARISH, WAINWRIGHT. .... 78 Mt. Vernon st., Boston, Mass.  
 SPIELMAN, JOHN G. .... 80 Fair st., Paterson, N. J.  
 YORK, HERBERT W. .... Room 5, Times Bldg., New York City.

## DEATHS.

- COCHRAN, A. P. .... Elected Fellow June 19th, 1872; died April 26th, 1889.  
 GOODWIN, JOHN M. .... Elected Member September 4th, 1872; died Oct. 21st, 1891.

## ADDITIONS TO LIBRARY AND MUSEUM.

- |   |  |
|---|--|
| <p>From Hon. John Bogart, State Engineer, N. Y.:<br/>         Annual Report of the State Engineer for 1890.<br/>         Seventh Annual Report of the Commissioners of the State Reservation at Niagara.<br/>         From Boston Public Library:<br/>         Bulletin for October, 1891.<br/>         From M. Chabal, Engr. Paris, Lyons and Medit. R. R.:<br/>         Etude Experimentale de la Vaporisation dans les Chaudières de Locomotive.<br/>         Notices sur le Material Roulant Exposé par le Service du Material et de la Traction.<br/>         From the Colombian Society of Engineers, Bogota:<br/>         Anales de Ingenieria, Nos. 1 to 24.<br/>         From Thomas Cook &amp; Son, N. Y.:<br/>         The Business of Travel.<br/>         From Geological Survey of Pennsylvania:<br/>         Atlas of Western Middle Anthracite Field.<br/>         Atlas of Northern Anthracite Field.<br/>         Atlas of Southern Anthracite Field.<br/>         Map of Union, Snyder, Mifflin and Juniata Cos.<br/>         From Malverd A. Howe, Terre Haute, Ind.:<br/>         Some Experiments to determine the strength of American vitrified Sewer Pipe.</p> | <p>From Illinois Society of Engineers and Surveyors:<br/>         Report of the Sixth Annual Meeting, 1891.<br/>         From Institution of Surveyors, Sydney, N. S. W.:<br/>         The Nature and Public Utility of Trigonometrical, General and Cadastral Surveys.<br/>         From Iron and Steel Institute, London:<br/>         Journal, November 1, 1891.<br/>         From Emil Kuichling, Chief Engineer Water Works, Rochester:<br/>         Fifteenth Annual Report of the Executive Board of the City of Rochester.<br/>         From J. Francis Le Baron, C.E., Jacksonville, Fla.:<br/>         The Florida Times Union.<br/>         From Marsden Manson, C. E., San Francisco, Cal.:<br/>         The Cause of the Glacial Period.<br/>         From John McGee, C. E., Buenos Ayres:<br/>         Librite del Campo, Sec. II.<br/>         From McGill College and University, Montreal, Can.:<br/>         Annual Calendar for 1891-92.<br/>         From W. Barclay Parsons, C. E., N. Y.:<br/>         Report of the Board of Rapid Transit Railroad Commissioners in and for the City of New York.<br/>         From H. V. &amp; H. W. Poor, N. Y.:<br/>         Hand-book of Investment Securities, 1891.</p> |
|---|--|

- From J. W. Post, C. E., The Hague, Holland:  
Le Réseau des Chemins de Fer de l'Etat a Sumatra.
- From Railroad Gazette, N. Y.:  
The India List, July, 1885.  
The Australian Hand-book, 1885.  
Twenty-two numbers of *Memoirs de la Société des Ingénieurs Civils*.  
Ten numbers of *Bulletin of U. S. Geological Survey*.  
Two volumes and seven odd numbers of *Giornale del Genio Civile*.  
Railroad and Engineering pamphlets.
- From State Agricultural College of Colorado:  
Third Annual Report of the Agricultural Experiment Station, 1890, Fort Collins, Colo.  
The Artesian Wells of Colorado and their relation to Irrigation.
- From State Board of Health, Mass.:  
Twenty-second Annual Report, 1890.  
Purification of Sewage and Water.
- From C. L. Stevenson, Salt Lake City, Utah:  
Irrigation Statistics of the Territory of Utah.
- From Hamilton Smith, Jr., London:  
Report of the Superintendent of the El Callao Mining Company, June 30, 1891.
- From U. S. Department of State:  
Reports from the Consuls of the United States, August, 1891.
- From U. S. Navy Department, Bureau of Equipment:  
Astronomical Papers. Vol. III, Part 5; Vol. II, Part 6.
- From U. S. War Department, Chief of Engineers:  
Survey of Water Way from Lake Michigan to La Salle.  
Proposals and Specifications, as follows:  
For Constructing Levees in the Fourth District, Mississippi River.  
For Construction of new Ice Piers in New Castle Harbor.  
For Construction of Railroad Track at James River, Va.  
For Construction of Foundation for a Mining Casemate at Pea Patch Island, Del.  
For Construction of Deck Barges, Coosa River, Ga.  
For Construction of Barges and Pile Driving Boat for Warrior River, Ala.  
For Dredging in Occaquan Creek, Va.; Ocracoke Inlet, N. C., and Penobscot River, Me.  
For furnishing Concrete Material for Fort Washington and Fort Monroe, Va.  
For furnishing ten Gate Anchorages, St. Mary's Falls Canal.  
For furnishing and placing Rip-rap Granite at Fort Adams, R. I.  
For Hoisting Engine and Boiler at Fort Washington, Md.
- From D. Van Nostrand Co., N. Y.:  
How to Become an Engineer.  
The Sextant and other Mathematical Instruments.  
Woodbridge School Essays. Dynamics of the Sun.

---

## BOOK NOTICES.

---

It is intended, in the future, to note the contents of such books relating to engineering and allied sciences as may be sent by publishers for the use of the Society.  
Publishers sending books will kindly mention price.

### THE BUSINESS OF TRAVEL; FIFTY YEARS' RECORD OF PROGRESS.

By W. FRASER RAE, 5½ x 8 inches, cloth, pp. 318. Table of contents. Thos. Cook & Son, London and New York, 1891.

At the end of fifty years Thomas Cook & Son issue a sketch of a life of the founder of the excursion business and a history of its origin and development. The fifty years embraced from July, 1841, when the first excursion train was run from Leicester to Loughboro', 11½ miles, to July, 1891, when their traveling facilities extended over nearly 2 000 000 miles of railroads, oceans and rivers.

### HOW TO BECOME AN ENGINEER.

By GEO. W. PLYMPTON, Am. Soc. C. E., 4 x 6 inches, bds., pp. 218. Van Nostrand Science Series, No. 100. D. Van Nostrand Co., N. Y., 1891. (Price, 50 cents.)

The sub-title of this book defines its object, "The Theoretical and Practical Training necessary in fitting for the Duties of the Civil Engineer. The opinions of Eminent Authorities and the Courses of Study in the Technical Schools." Abstracts from addresses of A. L. Holley, Pres. Am. Inst. Min. Engrs.; Thos. C. Clarke, M. Am. Soc. C. E.; Coleman Sellers, M. Am. Soc. C. E.; Professor Fairman Rogers and others, on technical education, add interest to the work.

**THE SEXTANT AND OTHER REFLECTING MATHEMATICAL INSTRUMENTS.**

By F. R. BRAINARD, United States Navy, 4 x 6 inches, bds., pp. 120, 33 illustrations. Van Nostrand Science Series, No. 101. D. Van Nostrand Co., New York, 1891. (Price, 50 cents.)

The history and description of the Sextant, Vernier and Telescope are here given, with practical hints, suggestions and wrinkles in their errors, adjustments and use.

**THEORETIC ASTRONOMY, DYNAMICS OF THE SUN. WOOD-BRIDGE SCHOOL ESSAYS, No. 1.**

By J. WOODBRIDGE DAVIS, C. E., Ph.D.,  $8\frac{1}{2} \times 10\frac{1}{2}$  inches, paper, pp. 156, Order of topics, Index. D. Van Nostrand Co., N. Y., 1891. (Price, \$3.)

The various chapters of this book are devoted to Matter—Gravity—Heat, The Outlying Atmosphere, The Quiescent Atmosphere, The Solar Atmosphere, Planetary Atmospheres, Planetary Magnetism, Planetary Electricity and Cometary Atmospheres. The subject of Planetary Electricity is subdivided into Electric tides, Galvanic currents, Interpretations and Atmospheric electricity. That necessary adjunct to a good book, a full index, is given with this well printed volume.

# American Society of Civil Engineers.

---

## PROCEEDINGS.

---

Vol. XVII.—November, 1891.

---

## MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

---

### OF THE SOCIETY.

NOVEMBER 4TH, 1891.—The Society met at 20 o'clock, Vice-President Fteley in the Chair; F. Collingwood, Secretary. Ballots were canvassed and the following candidates were declared elected: As Members—James Smith Haring, Tuxedo Park, N. Y.; Lucian Arnold Taylor, Boston, Mass.; Edmund Kimball Turner, Marblehead, Mass. As Associate Members: Martin Joseph Caples, Cambria, Va.; William Channing Cushing (elected Junior, June 5th, 1889), Indianapolis, Ind.; Emmett Clarke Dunn, Alexandria, Va.; Marmaduke Ward Easby, Johnstown, Pa.; James David Moffet, Radford, Va.; Nathaniel Roberts, Jersey City, N. J.; Archer Cochran Stites (elected Junior, December 3d, 1890), Kansas City, Mo.; J. Milton Willard, Tacoma, Wash.

The death of A. P. Cochran, F. Am. Soc. C. E., on April 26th, 1889, and the death of John M. Goodwin, M. Am. Soc. C. E., on October 21st, 1891, were announced by the Secretary.

The Secretary reported that at a meeting of the Board of Direction, held October 8th, the following were elected: As Juniors: Charles Winslow Sherman, Ithaca, N. Y.; Taro Tsuji, Kansas City, Mo.

Discussion on the paper by George W. Rafter, M. Am. Soc. C. E., on "The Hydraulics of the Hemlock Lake Conduit of the Rochester Water Works," from E. Sherman Gould and W. N. Randenhurst, Members Am. Soc. C. E., were read by the Secretary.

A paper by George W. Rafter, M. Am. Soc. C. E., on "The Measures for Resisting the Use and Waste of Water, in force in the City of Roches-



ter," was read by the Secretary, and discussed by Messrs. J. Nelson Tubbs, John Thomson and L. N. Case.

A paper by William L. Saunders, M. Am. Soc. C. E., on "Modern Methods of Quarrying," was read by the author, and discussed by Mr. L. L. Buck.

NOVEMBER 18TH, 1891.—The Society met at 20 o'clock, Vice-President Fteley in the chair; F. Collingwood, Secretary. The paper by George W. Rafter, M. Am. Soc. C. E., on "The Hydraulics of the Hemlock Lake Conduit of the Rochester Water Works," was discussed by Mr. Hering.

A paper by A. P. Boller, Jr., and H. J. Schumacher, on "The Experimental Determination of the Rolling Friction in operating the Draw of the Thames River Bridge," was read by Mr. Boller and discussed by Messrs. Buck, A. P. Boller, Breithaupt, Skinner, Owen and A. P. Boller, Jr.

The Secretary presented a "Table of Tests of Iron Axles made for the Chicago, Burlington and Quincy Railroad," presented by B. F. Peacock, Superintendent Mill and Forge Department, United States Rolling Stock Company, Anniston, Ala.

#### OF THE BOARD OF DIRECTION.

NOVEMBER 5TH, 1891.—A letter from the American Society of Mechanical Engineers, upon the subject of extending an invitation to the foreign engineering societies to visit this country at the time of the Columbian Exposition in 1893; also a letter from President Chanute, calling attention to a circular, issued by the Executive Committee of the General Committee of Engineering Societies, Columbian Exposition, in which it was stated that the share of the American Society of Civil Engineers would be \$3000 instead of \$1500 for the expense of Engineering headquarters, were presented. These two communications were referred to a committee to report upon the proper action to be taken.

Treasurer Bogart reported as to the necessary papers to be filed in connection with the increase in the number of Trustees of the Society, after the next election of officers.

The question of allowing books to be taken from the Library for consultation by members, was referred to the Library Committee for report.

It was ordered that the abbreviation for Associate Member be changed to Assoc. M. Am. Soc. C. E., instead of A. M. Am. Soc. C. E., as the latter is liable to be misunderstood. Action was taken as to members in arrears.

The following were elected as Juniors of the Society: Frederick Beecher Lawton, New York City; Asa Emory Phillips, Washington, D. C.

## MEMOIRS OF DECEASED MEMBERS.

---

WILLIAM BAKER KNIGHT, M. Am. Soc. C. E.\*

---

DIED DECEMBER 6TH, 1890.

---

William Baker Knight was born in Brooklyn, N. Y., in 1848, and received his education at the Rensselaer Polytechnic Institute and at Union College.

In 1867 Mr. Knight began the active practice of engineering on surveys for the Hudson River West Shore Railway, and filled all the subordinate positions in the engineering organizations of various and important public works during the following twelve years.

He was Assistant Engineer on the New Haven, Middletown and Wilimantic Railway, on the Brunswick and Albany Railway of Georgia, on the four-track construction of the New York Central Railroad and other railroad enterprises, and served in different capacities on public works in Washington, D. C., the Boston Water Works, and the Drainage Works in the Twenty-fourth Ward of New York City. In February, 1878, he went to the Isthmus of Panama as Private Secretary and Assistant to the General Superintendent of the Panama R. R. & S. S. Co., remaining there until August, 1879, when his health compelled him to return to the North. During these twelve years were some which were full of discouragement; and Mr. Knight did hard and conscientious work in many places, obtaining a valuable and extensive experience, always single minded, industrious and faithful to his employers and his friends.

In the autumn of 1879 he became associated in a business partnership with Mr. Daniel Bontecou, M. Am. Soc. C. E., and established himself in a private practice in Kansas City, Mo. His natural temperament and varied experience had adapted him in a high degree to his new environment and his professional responsibilities rapidly increased. He carried out successfully many improvements for the K. C. F. S. & G. R. R. and other corporations, and in the spring of 1882 was appointed City Engineer. The city had at this time but few improvements; the engineer's office was without system, precedents or records; these he supplied, and during the following three years dealt successfully with the numerous questions of policy and of constructive detail which crowded upon him, and developed a high degree of executive ability. He conducted his office forcibly and honestly, and on his retirement, his official course was cordially commended by the best element among the property owners.

---

\* Memoir prepared by D. Bontecou, M. Am. Soc. C. E.

In 1885 Mr. Knight resumed the more attractive duties of a private practice, and the firm being soon appointed Chief Engineers of the Metropolitan Street Railway Company, he constructed 12 miles of cable railway for that company. He was also Chief Engineer of the Kansas City Belt Railway Company from 1886 until his death. In 1889 the firm of Knight & Bontecou was dissolved by mutual consent, and Mr. Knight became identified with the Kansas City Circle Railway, and with many other enterprises, as Chief Engineer, but made street railway engineering a specialty. He soon became widely recognized as an expert in this class of work, and built electric railways in Kansas City and Joplin, Mo., and in Augusta, Ga., and a cable railway in Tacoma.

He had many plans in view, some of which were about to culminate, and his value and capacity for useful work were probably at their maximum, when he was fatally injured in a railway accident, and died at Jacksonville, Ill., a few days later.

In his professional and business career, Mr. Knight was sanguine in his judgment, and self-reliant, with a quick appreciation of character and unusual powers of organization. At all times he received respect and warm regard from his subordinates, and extended ready courtesy to those who came in contact with him. In his personal qualities he was genial and attractive, with the faculty of making many friends. He was fond of his profession, and active in promoting the interest of the Engineers' Club of Kansas City, of which he was for several years President. He became connected with the American Society of Civil Engineers, as a Junior, January 6th, 1875, and became a Member January 7th, 1880.

---

## LIST OF MEMBERS.

---

### ADDITIONS.

#### MEMBERS.

	Date of Election.
HARING, JAMES SMITH.....Tuxedo Park, N. Y.....	Nov. 4, 1891
HASKELL, CHARLES FRED. BEALS.Wenatchee, Wash.....	Oct. 7, 1891
TAYLOR, LUCIAN ARNOLD .....U. S. Hotel, Boston, Mass.....	Nov. 4, 1891
TURNER, EDMUND KIMBALL.....53 State St., Boston, Mass.....	Nov. 4, 1891

#### ASSOCIATE MEMBERS.

CAPLES, MARTIN JOSEPH.....Assistant Engineer in charge Maintenance of Way, Radford Div. N. & W. Ry., Radford, Va.....	Nov. 4, 1891
--	--------------

		Date of Election.
CARROLL, EUGENE.....	Butte City Water { ..... J.	Jan. 4, 1888
	Co., Butte, Mont. { Assoc.M.	July 1, 1891
CUSHING, WILLIAM CHANNING ...	Engineer Maintenance of Way	
	Ind. Div. P. C. C. & St. L.	
	Ry., Indianapolis, { ..... J.	June 5, 1889
	Ind..... { Assoc.M.	Nov. 4, 1891
EASBY, MARMADUKE WARD.....	36 Potts st., Johnstown, Pa....	Nov. 4, 1891
MOFFET, JAMES DAVID.....	Assistant Engineer Maintenance of Way, Norfolk and Western Ry., Radford, Va. .	Nov. 4, 1891
STITES, ARCHER COCHRAN .....	Keith and Perry Bldg., Kansas City, { ..... J.	Dec. 3, 1890
	Mo..... { Assoc. M.	Nov. 4, 1891

## JUNIORS.

BEARD, ELMER HARRY .....	Assistant Supervisor Philadelphia and Reading R. R., Pottsville, Pa.....	Sept. 10, 1891
ROGERS, WALTER ALEXANDER...	Assistant Engineer Northern Pacific R. R., Livingston, Mont.....	Sept. 10, 1891
LAWTON, FREDERICK BEECHER...	P. O. Box 109, Brooklyn, N. Y.	Nov. 5, 1891

## CHANGES AND CORRECTIONS.

## MEMBERS.

APPLETON, ELLERY C. ....	Assistant Engineer Boston Water Works, Westboro, Mass.	
BAKER, WILLIAM H. ....	Chief Engineer Pan American Ry., Victoria, Texas.	
BARLOW, JOHN Q.....	15 Haller Bldg., Seattle, Wash.	
BAYLISS, R. T. ....	54 Old Broad st., London, E. C., England.	
BIXBY, WILLIAM H.....	Capt. Corps of Engineers U. S. A., Newport, R. I.	
BLACK, WILLIAM M.....	Capt. Corps of Engineers U. S. A., Willett's Point, Queens Co., N. Y.	
BURR, EDWARD .....	First Lieut. Corps of Engineers U. S. A., Norfolk, Va.	
CALKINS, FRANK A. ....	Ogden, Utah.	
DODGE, JOSEPH T.....	340 Washington ave., Madison, Wis.	
EMERSON, GEORGE D.....	Roseburg, Ore.	
FULTON, JOHN A.....	160 Muirson st., Cleveland, O.	
GERMANN, FRANZ.....	Hoffman House, New York City.	
GIAVER, JOHN G. ....	1143 The Rookery, Chicago, Ill.	
GRANT, EMERSON W.....	El Paso Smelting Works, El Paso, Texas.	
HAINS, PETER C. ....	Lt. Col. Corps of Engineers U. S. A., Portland, Me.	

HALL, JULIEN A. ....	Morotock P. O., Pittsylvania Co., Va.
HUDSON, JOHN R. ....	58 West 57th st., New York City.
HUGHES, WILLIAM M. ....	City Engineer's office, Chicago, Ill.
JOHNSTON, HORACE G. ....	Marlin, Texas.
KIERSTED, W. ....	619 Keith and Perry Bldg., Kansas City, Mo.
MASON, ARTHUR J. ....	1423 Jefferson st., Kansas City, Mo.
McKEOWN, THOMAS. ....	905 Seneca st., Buffalo, N. Y.
McLAIN, LOUIS R. ....	Miner and Shipper of Florida Hard Rock Phosphates, Pemberton, Fla.
NICOLLS, WILLIAM J. ....	Treas. Irvona Coal Co., 420 Walnut st., Phila- delphia, Pa.
PARKER, C. O. ....	33 Keystone Bldg., Chattanooga, Tenn.
PETRY, ALFRED. ....	911 Scott st., Covington, Ky.
SONNE, O. F. ....	P. O. Box 3051, Boston, Mass.
STUART, A. A. ....	(Care Terminal R. R. Association), Union Depot, St. Louis, Mo.
THOMPSON, GEORGE M. ....	Lock Box 684, Plainfield, N. J.
TRUESDELL, CHARLES ....	U. S. Assistant Engineer, 1428 Arch st., Phila- delphia, Pa.
VAN WINKLE, EDGAR B. ....	Lakewood, N. J.
WIMMER, SEBASTIAN. ....	St. Vincent, Beatty P. O., Pa.

## ASSOCIATE MEMBERS.

CARROLL, EUGENE ....	(Care Butte Water Co.), Butte, Mont.
FARLEY, JOHN M. ....	Fort Plain, N. Y.
THOMSON, T. KENNARD ....	Box 119, Elmira, N. Y.

## JUNIORS.

ABBOTT, ARTHUR V. ....	North Ave. Ry., Blackstone Bldg., Baltimore, Md.
BLODGETT, JOHN. ....	132 Germania Life Bldg., St. Paul, Minn.
DURYEA, EDWIN ....	(Care A 559 Woodlawn ave.), Chicago, Ill.
KIBBLE, AUG. S. ....	State Engineer's office, Albany, N. Y.
PANI, CAMILO E. ....	(Care A. S. Burdette, Paymaster M. C. R. R.), Mexico, Mexico.
PARSONS, SIDNEY A. ....	Assistant Engineer Snohomish, Skykomish and Spokane R. R., Everett, Wash.
SPIELMAN, JOHN G. ....	Union Bridge Co., Athens, Pa.
WHEATLEY, JOHN Y. ....	Irvington-on-Hudson, N. Y.

## DEATHS.

ROBINSON, MONCURE ....	Elected Honorary Member, July 6, 1853; died November 10, 1891.
LOCKWOOD, JOHN. ....	Elected Associate April 5, 1882; died November 28, 1891.
WHEATON, EDWARD. ....	Elected Associate March 3, 1880; died March 6, 1889.



## ADDITIONS TO LIBRARY AND MUSEUM.

---

- From American Institute of Architects :  
23d and 24th Reports of Annual Conventions, 1889, 1890.
- From American Institute of Mining Engineers :  
A New System of Ore Sampling.  
Centrifugal Ventilators.  
Mining in Honduras.  
Notes on the Iron Ores of Danville, Pa.  
Proceedings of the Sixtieth Meeting, Glen Summit, Pa., October, 1891.  
The Bendigo Gold Field.  
The Fuel Supply of the United States.  
The Handling of Ingots and Molds in Bessemer Steel Works.  
The Tests and Requirements of Structural Wrought Iron and Steel.  
The Utilization of Puddle and Reheating Slags for Paint Stock.
- From American Society of Mechanical Engineers :  
Transactions, Vols. II, XIX.
- From Samuel G. Artingstall, C. E., Chicago, Ill.:  
Elektrische Strassenbahn Ueberführung in Los Angeles.
- From Cornell University, Ithaca, N. Y.:  
Annual Report of the President for 1890-91.
- From Caspar W. Haines, C. E., Guatemala.  
Informe de la Comision que por Orden des Supremo Gobierno inspecciona las Obras del Agua de esta Capital, 1891.
- From M. L. Holman, C. E., St. Louis, Mo.:  
Report of Commission of Hydraulic Engineers to the Board of Public Works, Kansas City, Mo.
- From Alfred E. Hunt, C. E., Pittsburgh, Pa.:  
Hydraulic Cement.
- From Institution of Civil Engineers, London:  
Minutes of Proceedings, Vol. CVI.  
Brief Subject-Index, Vols. LIX. to CVI.  
Engineering Education in the British Dominion.
- From Institution of Engineers and Ship-builders in Scotland:  
Transactions, Vol. XXXIV.
- From A. Wm. Jardine, M. Inst. C. E., Melbourne, Australia:  
Report of the Engineer for Harbors and Rivers, Queensland, to June 30, 1891.
- From Robert E. McMath, C. E., St. Louis, Mo.:  
Annual Report of the Sewer Commissioner for the fiscal year ending April 13, 1891.
- From New York State Library:  
Regents' Bulletins, Nos. 1 to 7 inc.  
State Library Bulletin, July and August, 1891.
- From Edward P. North, C. E., New York:  
Manuel de l'ingenieur des Ponts et Chaussées, 9th Fascicule.  
Practical Geodesy; comprising Chain Surveying and the use of Surveying Instruments.
- From Hon. Robert P. Porter, Washington, D. C.:  
The Eleventh Census.
- From A. Raddi, C. E., Milan, Italy:  
Le Sorgenti che alimentano l'Acquedotto di Spezia.
- From Secretary for Mines, Victoria, N. S. W.:  
Reports and Statistics of the Mining Department for the quarter ending 30th June, 1891.
- From James M. Swank, Iron and Steel Association, Philadelphia:  
Report of the Secretary of the Iron and Steel Association for 1887, 1888.  
The Metal Schedule of the Tariff Act of 1890.  
The Question of Tariff Revision.
- From U. S. Bureau of Education, Washington, D. C.:  
Higher Education in Indiana.  
Rules for a Dictionary Catalogue.  
Publications of the U. S. Bureau of Education.
- From U. S. Ordnance Department :  
Effects of Fire on Gun Carriages, being Notes on the Construction of Ordnance No. 10.
- From Emrick A. Werner, C. E., Chicago, Ill.:  
Träger auf Zwei Stützen.
- From World's Columbian Exposition, Chicago, Ill.:  
The World's Fair at Chicago.



# American Society of Civil Engineers.

---

## PROCEEDINGS.

---

Vol. XVII.—December, 1891.

---

## MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

---

### OF THE SOCIETY.

DECEMBER 2D, 1891.—The Society met at 20 o'clock, Director Charles B. Brush in the chair; F. Collingwood, Secretary. Ballots were canvassed and the following candidates were declared elected: As Members: Daniel Burke Dunn, Macon, Ga.; Fred Putnam Spalding, Ithaca, N. Y.; James W. Way, St. Louis, Mo. As Associate Members: George Goodell Earl (elected Junior, May 7, 1890), Americus, Ga.; Oscar Erlandsen (elected Junior, May 1, 1889), Poughkeepsie, N. Y.; George Thomas Richards, Pittsburgh, Pa.; William Watmough Thayer, Philadelphia, Pa.

The death of Moncure Robinson, Hon. M. Am. Soc. C. E., on November 10th, 1891, and the death of Edward Wheaton, Assoc. Am. Soc. C. E., on March 6th, 1889, were announced by the Secretary.

A paper by J. A. L. Waddell, M. Am. Soc. C. E., on "Some Disputed Points in Railway Bridge Designing," was read, and discussed by

Messrs. G. H. Blakeley, A. J. DuBois, H. B. Seaman, T. C. Clarke and W. H. Breithaupt.

DECEMBER 16TH, 1891.—The Society met at 20 o'clock, President Chanute in the chair; A. Fteley, Secretary *pro tem*.

The death of John Lockwood, Assoc. Am. Soc. C. E., on November 28th, 1891, and the death of Col. William E. Merrill, M. Am. Soc. C. E., on December 14th, 1891, were announced by the Secretary.

The Secretary presented a "Velocity Diagram for Clean Coated Cast Iron Water Pipes Under Pressure," compiled by James Duane, C. E.; also a circular issued by the U. S. Department of Agriculture, and some data and photographs received from Professor J. B. Johnson, M. Am. Soc. C. E., in reference to Government Timber Tests.

A paper by Messrs. Samuel M. Rowe, S. W. Robinson and H. H. Quimby, Members Am. Soc. C. E., on "The Red Rock Cantilever Bridge," was read, and discussed by Messrs. J. F. Wallace, Charles MacDonald and W. H. Breithaupt.

#### OF THE BOARD OF DIRECTION.

DECEMBER 3D, 1891.—The Finance Committee was authorized to secure an expert accountant to examine the books of the Society and make a written report to the Board, in accordance with the requirements of the Constitution. The Library Committee reported certain resolutions as to the use of the library, which have been sent out to the Society; also as to a proposed change in the form of the publications, which were referred to the next Board for consideration. The proposition is to issue a semi-monthly publication, to contain all notices, minutes of meetings and brief abstracts of papers to be read, and to issue the Transactions by themselves in four quarterly volumes each year. The Secretary presented a communication from the President respecting Tests of Timber now being made at Washington University, St. Louis, by Professor J. B. Johnson, M. Am. Soc. C. E., asking the support of the Society and its influence. The Secretary was directed to write to the Secretary of the Department of Agriculture expressing the interest the Society took in the subject and its desire that the tests might be carried out to completion.

The following committee was appointed to make arrangements for the annual meeting: Messrs. Charles Warren Hunt, Frank W. Skinner and William J. Haskins. Miscellaneous business was transacted. Applications considered.

The following were elected as Juniors of the Society: Western Radford Bascome, St. Louis, Mo.; Archibald Robertson Browne, Albany, N. Y.; Thomas Harrold, Croton Falls, N. Y.; Richard Khuen, Jr., New York City; B. W. McFarland, New Haven, Conn.; William Drummer Sell, Logan C. H., W. Va.

## MEMOIRS OF DECEASED MEMBERS.

---

WILLIAM L. SCOTT,\* F. Am. Soc. C. E.

---

DIED SEPTEMBER 19TH, 1891.

---

William Lawrence Scott was born in the City of Washington, July 2d, 1828, while his parents were temporarily resident there. His grandfather, Gustavus Scott, was prominent in the early history of the government, being a delegate from Maryland to the Continental Congress in 1781, and afterward appointed by President Washington the first Commissioner of Public Buildings for the City of Washington.

Major Robert J. Scott, the father of William L., was a Virginian by birth. A graduate from the United States Military Academy at West Point, he served as an officer in the army during the war of 1812, and for three years afterward. He then resigned his commission and entered into business at Fortress Monroe, Va. Dying in 1835, when he had accumulated but little property, the care of his family of five children (two of whom died young) devolved upon his widow, who was a daughter of Colonel Henry Lewis of Virginia. She proved to be a woman of energy and tact, and was able to keep her family together and provide for them till such time as they were able to take care of themselves. The elder of her two remaining sons, Robert Wainright Scott, was educated at the Naval Academy at Annapolis, and entered the navy. He served with distinction during the Civil War, and died while commander of the United States ship *Saginaw*, in the port of Acapulco, Mexico, July 5th, 1866.

William L. Scott was a student of Hampden Academy, near Fortress Monroe, and received such education as an active minded and ambitious boy could acquire before his thirteenth year. He was appointed a page in the lower house of Congress in 1840, and served in that capacity for six years. During the recess of Congress each year he continued his studies at the Academy. In 1846 he was induced by General Charles M. Reed, Member of Congress from the Erie (Penn.) District, to come to Erie and enter his employment as a shipping clerk. The lake trade was very large at that time. General Reed owned many steamboats plying between Buffalo and Chicago and other lake ports, and was also extensively engaged in the coal trade on the "Erie Extension" of the Pennsylvania Canal. Mr. Scott continued in the same position, in connection with General Reed's business, till 1850. Feeling himself then qualified to embark in business on his own account, he formed a copartnership

---

\* Committee to prepare Memoir, William W. Reed, F. Am. Soc. C. E.



with the late Morrow B. Lowry in the lake and canal trade. That arrangement lasted for but one year, when he joined with the late John Hearn in the coal and forwarding business, under the firm name of John Hearn & Co. This partnership may be regarded as the foundation stone of the fortune which, within the next forty years, he was to build up into colossal proportions.

After Mr. Hearn's death, in 1871, Mr. Scott continued the same business, and, taking in other partners, established the firm of W. L. Scott & Co. Through the purchase of coal lands and the great enlargement of mining operations, the business was extended till it became one of the largest of the kind in the world. Mr. Scott was the owner of much the largest share of this immense business, and to his wise and energetic management was mainly due the success to which it finally attained.

Mr. Scott's marriage, in 1853, to Miss Mary Matilda Tracy, the eldest daughter of the late John A. Tracy, Esq., of Erie, a gentleman of wealth and social standing and prominent in railroad affairs, was very helpful to him in a business way. By this alliance he was also brought into close relations with Mr. John F. Tracy, his wife's brother, who had developed a wonderful capacity as a railroad builder and manager, especially in the West. Mr. Scott thus became connected with some of the most important railroad enterprises in that quarter.

A railroad from the City of Erie to Pittsburgh had been in course of construction for several years—now suspended and now vigorously prosecuted. In 1866 Mr. Scott and some of his business friends got control of the enterprise. It was finally completed, and after being operated successfully for several years, it was leased for nine hundred and ninety-nine years, on very favorable terms, to the Pennsylvania Railroad Company. The Erie Extension Canal was purchased in the interest of the railroad company, and that important competing line of transportation to the coal fields of western Pennsylvania was closed.

In conjunction with John F. Tracy, Mr. Scott constructed the Chicago, Rock Island and Pacific Railroad—being the first railroad built to the Missouri River. He was also interested in establishing the first elevated railroad in the City of New York; and it was not without much persistent personal effort on his part that the Legislature at Albany was prevailed upon to grant the franchise for building the road.

Mr. Scott bore a prominent part in the construction of the New York, Philadelphia and Norfolk Railroad. He was a large stockholder in the Lake Shore Railroad Company, the Pennsylvania Central, and the New York Central. He took upon himself a large share in the development of the Canada Southern and Canadian Pacific Railways, and also in that of the Denver and Rio Grande and Union Pacific Railroads. He was, at the time of his death, a director in the following named railroad companies: The Lake Shore and Michigan Southern, the Chicago and North Western, the New York, Philadelphia and Norfolk, the Pittsburgh, Cin-

cinnati, Chicago and St. Louis, the New Castle and Beaver Valley, and the Michigan Central, and President of the Erie and Pittsburgh Railroad Company.

Mr. Scott had also purchased many thousands of acres of farm lands, which he maintained in the highest state of cultivation. He had the best breeds of cattle. His stud of thorough-bred horses was famous, and his Algeria Stud Farm was one of the largest and best equipped establishments of the kind in the country. He was extensively engaged in the manufacture of iron both in his own State and in the West; was a large stockholder in banking institutions, and in gas and fuel companies, and gave a helping hand to many minor enterprises. While he often made large sums of money in railroad "deals" and in buying and selling stocks, the great mass of his immense wealth was accumulated in real business—manufacturing, building, railroad construction, the opening and improvement of farm lands, the working of mines, etc., in which thousands of men were employed, hundreds of families supported, villages planted, large towns made to grow and prosper, and comfort and the means of living created wherever his liberal and fostering hand reached.

But Mr. Scott did not permit his attention to be absorbed entirely in business. The active part that his immediate ancestors bore in the government of the country during the period of its earlier history, as well as the opportunity which his service as a page in Congress for six years afforded him of observing the workings of politics on that broad arena, led him naturally to take an interest in public affairs. But it was not till 1876 that he began to bear a leading part in party politics. He was a member of the Democratic National Committee in that year, when Samuel J. Tilden, to whom he was personally strongly attached, was the Democratic candidate for President, and he held the same position during the presidential contests of 1880 and 1884. In the latter year he was the candidate of his party for Congress in the Erie District, and was elected by a handsome majority, although the district had previously been strongly Republican. As a member of Congress he gained the reputation of a statesman of commanding talents and broad views. He was again elected in 1886, and became one of the closest and most trusted advisers of President Cleveland. He developed a talent for public speaking, and gained distinction by his able discussion of the tariff, the silver coinage question, the bill for the exclusion of the Chinese, and other important national measures.

But the severe strain that came upon him during his political career, added to the exacting demands of his immense business, severely affected his health; and he began to make what effort seemed possible to lighten the burden both of political and business responsibility that rested upon his shoulders. Always a man temperate and even abstemious in his habits, and having great power of self-control, he took special care of

what seemed to be a weak place in his constitution, that of the digestive organs. But notwithstanding his own care and the constant watchfulness and aid of a skillful physician, his health suddenly broke down in the summer of 1890 (the stomach being the seat of the disorder), and although he rallied for a time, his strength gradually failed, and he died on September 18th, 1891.

The body was removed to Erie, and, on September 24th, deposited in the Erie Cemetery in the beautiful granite mausoleum, completed but a few months before (fit emblem of the solid worth of his character, and the imperishable nature of his influence upon his own city and the land which he had served and loved so well). Many prominent men and an immense throng of people testified their respect for the deceased by attending the funeral.

Thoroughness, persistency and energy were among Mr. Scott's great qualities. He never did anything by halves. If it was a business enterprise that offered, he first made himself thoroughly acquainted with the details of the project, and then either rejected it utterly and cast it out of his mind, or else entered into it with all the energy of his nature. If he was to give his support to a political measure, he made an exhaustive study of the subject, and then bent all the powers of his mind to a clear and thorough discussion of it. Although of an intense spirit and capable at times of great excitement, he never harbored resentment, nor did he regard as personal enemies those who had been his political foes or business competitors.

Mr. Scott was a quiet man in his habits. He usually wore when in repose an abstracted air, yet he never failed to recognize any acquaintance, however humble, whom he chanced to meet on the street. He was in no sense a selfish man, nor indifferent to those in want or trouble. He had indeed a warm and sympathetic heart; and his personal charities, always bestowed without ostentation, were very large. Born and reared an Episcopalian, and in a home in which religion was something more than a mere form, he was strongly attached to the church of his choice, and gave liberally to its support both in Erie and elsewhere. He also contributed generously to hospitals, the Home for the Friendless and various other charitable institutions.

He was fond of his home and devoted to his family, and unless absent on business, made that his haven of rest. He had a very large and well selected library, and spent much of his leisure time among his books, often sitting far into the night. His reading took a wide range, and from his boyhood he made a constant study of the Bible.

When such a man, clean in life and upright in character, a reputable citizen, bearing an influential part in the political affairs of the country, full of charity and good deeds, beloved by his family, trusted by his friends and respected by the entire community in which he has lived—after spending forty years of an intensely busy life—drops away from

the sight of men, is it not most fitting that he should be highly honored, and that his character and achievements—whatever lapses from perfection there may have been in the midst of the stress and struggle of life—should be held up for the emulation of those who are to come after him?

Surely it may be justly said of William L. Scott :

He lived to bless and not to harm the world ; and

“ After life’s fitful fever he sleeps well.”

## NOTES AND MEMORANDA.

Mr. CASPAR W. HAINES, M. Am. Soc. C. E., on the survey for the Inter-Continental Railway Commission, writes from Rexalhulen, Guatemala, C. A., on December 1st, as follows:

I am sorry to say that I have no interesting news to communicate about this work. The brush and jungle is so extremely thick and hard to penetrate that we make very slow progress, and so far have confined ourselves more to making a general map of the country passed through than attempting to run a railroad line. In fact, in the absence of all maps and even approximate knowledge of the country by the very inhabitants thereof, it is the only way we could find out anything. We have covered a belt of country some 20 miles wide and I think shall be able to make a fairly accurate topographical map of it.

We had rather hard times during the rainy season; frequently we sat at the dinner table at the evening meal with 2 to 4 inches of water running under our stools. At that camp the ground was so flat that ordinary tent ditches would not carry off the water. The rains are about over now till April or May, and we may perhaps succeed in doing quicker work.

Notwithstanding the rain, wet and discomfort, we have all been very well; scarcely a case of sickness. We have been running along at an altitude above sea level of from 400 to 1 400 feet. The climate is fine, 65 degrees Fahrenheit is the lowest at night and about 85 degrees Fahrenheit the very highest during a short time in the day, but not every day.

The barometer works with very great regularity and has given some surprising results, comparing the barometric altitudes with those obtained by Y level.

The great trouble in this country is to get reliable men and servants or indeed any at all. I do not exaggerate when I say that thousands of quintals of coffee are lost every year because the planters cannot get laborers to pick it.

The common people are Indians who are in a manner civilized—that is, they are not nomadic and go to church; but they dress and live about



as they did before the Spanish conquest, and I have seen large towns where only one or two persons speak Spanish. They speak their own language.

They are used largely as beasts of burden and carry from 100 to 150 lbs. on the back supported by a broad strap across the forehead. We use them some for moving camp. We go to the mayor of the nearest town or village and tell him we need so many carriers on such a day and he has to send them. They are paid 50 cents a day without food. Their dress is a breech clout, a hat and sandals. The women wear a sort of skirt made of a piece of bright colored cloth wound around the waist and fastened; it reaches from the hips to the knee; the body, feet and head are bare.

CHANNING M. BOLTON, M. Am. Soc. C. E., writes from Atlanta, Ga., enclosing a copy of a bill prepared by him for presentation to the Legislature of Virginia, for the improvement of the roads in the State.

The bill provides for the appointment by the Board of Public Works of a Chief Engineer of experience, to serve for five years. His powers to be similar to those of a chief engineer of a railroad, subject to the control of the appointing board, except that he appoints his own assistants.

The Board orders the surveys and selects the roads to be improved after the engineer has reported upon them, and provision is made for the construction of the roads by convict labor.

The Chief Engineer is to fix all grades and alignments, furnish plans for bridges, etc., and superintend construction.

Where proper material can be had, roads are to be macadamized 10 inches deep and either 10 or 20 feet wide. Railroads are to be crossed either above or below grade, when practicable.

All payments to be made by the Treasurer of the State, on monthly pay-rolls.

The tools and other appliances needed for the work are to be manufactured in the State Penitentiary.

---

## LIST OF MEMBERS.

---

### ADDITIONS.

#### MEMBERS.

		Date of Election.
HAINES, CASPAR WISTAR.....	Cheltenham, Montgom- ery Co., Pa.....	{ J. Feb. 2, 1876 M. Oct. 7, 1891
DUNN, DANIEL BURKE.....	Chief Engineer, Macon, Dub- lin and Savannah R. R., Macon, Ga.....	Dec. 2, 1891



		Date of Election.
SPALDING, FRED PUTNAM.....	Cornell University, Ithaca, N. Y.....	Dec. 2, 1891
WAY, JAMES W.....	Chief Engineer, Missouri Pacific Ry., St. Louis, Mo.	Dec. 2, 1891

## ASSOCIATE MEMBERS.

ERLANDSEN, OSCAR.....	Assistant Chief En- gineer, Dutchess County R. R., Poughkeepsie, N. Y.....	J. May 1, 1889 Assoc.M. Dec. 2, 1891
THAYER, WILLIAM WATMOUGH...	724 Spring Garden St., Phila- delphia, Pa.....	Dec. 2, 1891
WILLARD, J. MILTON.....	Lock Box 539, Portland, Ore..	Dec. 2, 1891

## JUNIORS.

BASCOME, WESTERN RADFORD...	52 Laclede Bldg., St. Louis, Mo.....	Dec. 3, 1891
HARROLD, THOMAS.....	Americus, Ga.....	Dec. 3, 1891
KHUEEN, RICHARD, JR.....	21 Cortlandt St., New York City.....	Dec. 3, 1891
McFARLAND, BOYNTON WELLS...	711 Emerson Ave., Syracuse, N. Y.....	Dec. 3, 1891
PHILIPS, ASA EMORY.....	1425 New York Ave., Wash- ington, D. C.....	Nov. 5, 1891

## CHANGES AND CORRECTIONS.

## MEMBERS.

BAILEY, GEORGE I.....	Mohawk, N. Y.	
BLACKWELL, CHARLES.....	14 St. James Ave., Cincinnati, Ohio.	
BRECKINRIDGE, CABELL.....	1028 Russell St., Covington, Ky.	
BURGWIN, C. P. E.....	819 E. Main St., Richmond, Va.	
DECOURCY, BOLTON W.....	Ocosta, Wash.	
ELLIOTT, CHARLES G.....	Normal, Ill.	
HALL, WILLIAM HAMMOND.....	Room 29, New Mercantile Library Building. 530 Golden Gate Ave., San Francisco, Cal.	
HARING, JAMES S.....	Suffern, N. Y.	
MARR, GEORGE A.....	U. S. Engineer's Office, Milwaukee, Wis.	
MARVIN, CHARLES E.....	General Manager, Macon and Suburban Land Co., Exchange Bank Bldg., Macon, Ga.	
MORRIS, S. FISHER.....	606 Kirk Block, Syracuse, N. Y.	
NASH, CHARLES H.....	232 West 14th St., New York City.	
RITCHIE, JAMES.....	Principal Assistant Engineer C. C. C. & St. L. Ry., Indianapolis, Ind.	
ROWE, SAMUEL M.....	332 Webster Ave., Chicago, Ill.	
SMITH, JARED A.....	Lieut. Col. Corps of Engineers, U. S. A., 89 Euclid Ave., Cleveland, Ohio.	

VAN AUKEN, ALVA M.....	803 Bank of Commerce Bldg., St. Louis, Mo.
VANCE, HART.....	223 Fourth Ave., Louisville, Ky.
WHITTON, ANDREW D.....	Yeadon, Fernwood, Delaware Co., Pa.
WOLCOTT, C. C.....	Civil Engineer, U. S. N., U. S. Navy Yard, League Island, Pa.

## JUNIORS.

DEANS, CHARLES H.....	2 Nassau St., New York City.
FISHER, ELSTNER.....	Asst. Division Supt., Michigan Central R. R., Jackson, Mich.
HODGE, HENRY W.....	Chief Engineer Union Iron Works, 29 Broad- way, New York City.
KOBAYASHI, K.....	7 Sasgayacho, Koishi Kawa, Tokio, Japan.
KONDO, T.....	Government Engineer's Office, Sendai, Japan.
LAWLOR, FRANK D. H.....	St. John, N. B., Canada.
MCGUIRE, JAMES C.....	1216 Eighteenth St., N. W. Washington, D. C.
SELBY, O. E.....	511 Commerce Bldg., Louisville, Ky.
SHERWOOD, GEORGE W.....	General P. O., San Francisco, Cal.

## RESIGNATIONS.

## MEMBERS.

	Date of Resignation.
BALSTON, OSCAR F.....	December 31, 1891
BARNARD, AUGUSTUS P.....	December 31, 1891
FARNHAM, ROSCOE E.....	December 31, 1891
HEMBERLE, EDWARD.....	December 31, 1891
SMITH, W. HARRISON.....	December 31, 1891
SYMINGTON, WILLIAM H.....	December 31, 1891
TAYLOR, BUSHROD W.....	December 31, 1891
TITLOW, J. MILTON.....	December 31, 1891
WHITNEY, JOSEPH.....	December 31, 1891

## JUNIOR.

STEWART, HUNTER.....	December 31, 1891
----------------------	-------------------

## DEATHS.

MERRILL, WILLIAM E.....	Elected Member, October 6, 1872; died De- cember 16, 1891.
REED, SAMUEL B.....	Elected Member, October 20, 1869; died De- cember 26, 1891.
WARDLAW, JAMES R.....	Elected Member, March 3, 1886; died Decem- ber 29, 1891.
WILSON, ARTHUR OWEN.....	Elected Member, March 7, 1888; died Decem- ber 20, 1891.

## DROPPED.

## MEMBERS.

	Date of Action of Board.
BUEL, RICHARD H.....	May 5, 1891
BONNYN, WM. WINGFIELD.....	September 10, 1891
BRITTAIN, ALFRED.....	October 8, 1891
CHASE, JOSIAH G.....	October 8, 1891
CHAPMAN, WILLIS D.....	October 8, 1891
FULLER, SIDNEY T.....	October 8, 1891
KELLY, WILLIAM E.....	October 8, 1891
MCCINTOCK, WILLIAM H.....	October 8, 1891
REED, HORATIO G. H.....	October 8, 1891
SAWYER, CHARLES H.....	October 8, 1891

## ASSOCIATES.

BELCHER, GEORGE C. W.....	December 31, 1891
DAVIS, EMORY C.....	October 8, 1891
LAWSON, LEONIDAS M.....	October 8, 1891

## JUNIORS.

ILLSLEY, WILLIAM A.....	October 8, 1891
MATLACK, CHARLES P.....	October 8, 1891
REUSCHEL, WILLIAM.....	May 5, 1891

## ADDITIONS TO LIBRARY AND MUSEUM.

- 
- |   |  |
|---|--|
| <p>From James Archbald, C.E., Scranton, Pa.:<br/>Specifications for Bridge Construction,<br/>Delaware, Lackawanna and Western R.<br/>R. Co.</p> <p>From Atchison, Topeka and Santa Fé R. R.<br/>Co.:<br/>19th Annual Report for the year ending<br/>June 30, 1891.</p> <p>From Geo. S. Baxter, Treasurer, Northern<br/>Pacific R. R. Co.:<br/>Annual Reports of the Northern Pacific<br/>R. R. Co., for 1876, 1877, 1883 to 1891,<br/>inc.</p> <p>From California Academy of Sciences:<br/>Proceedings, Vol. III.</p> <p>From Chicago, Milwaukee &amp; St. Paul R. R.<br/>Co.:<br/>Annual Reports, 5th, 7th, 13th, 14th, 15th,<br/>24th, 25th, 26th and 27th.</p> <p>From Cornell University, Ithaca, N. Y.:<br/>Annual Register for 1891-92.</p> | <p>From Engineering Magazine:<br/>Vol. I, Nos. 1, 3, 4, 5 and 6.<br/>Vol. II, Nos. 1, 2 and 3.</p> <p>From Professor E. A. Fuertes, Cornell Uni-<br/>versity:<br/>2d Annual Report of Commissioners of<br/>the State Meteorological Bureau.</p> <p>From J. T. Fanning, D. C. Dunlap and D. W.<br/>Mead, Commissioners:<br/>Report on an Additional Water Supply<br/>for the City of Rockford, Ill.</p> <p>From Harvard University, Cambridge, Mass.:<br/>University Catalogue, 1891-92.</p> <p>From J. B. Henderson, Hydraulic Engineer,<br/>Brisbane, Queensland:<br/>Report of the Hydraulic Engineer on<br/>Water Supply.</p> <p>From Institution of Civil Engineers, London,<br/>England:<br/>Minutes of Proceedings, Vol. XXIX.</p> |
|---|--|

- From John Kennedy, Chief Engineer, Harbor Commissioner, Montreal, Can.:  
Report of the Montreal Flood Commission. Maps to accompany the Annual Report of Public Works, Canada, 1889-90.
- From G. Leverich, C. E., Brooklyn, N. Y.:  
Report of the Trustees of the New York and Brooklyn Bridge for the year ending December 1, 1891.
- From Midland Institute of Mining, Civil and Mechanical Engineers:  
Transactions, Parts LIX and LXXX. Proceedings, Parts CIX and CX.
- From Mexican Central Railway Co.:  
9th, 10th and 11th Annual Reports for 1888, 1889 and 1890.
- From Edward A. Moseley, Secretary, Washington, D. C.:  
2d and 4th Annual Reports of the Interstate Commerce Commission, 1888, 1890.
- From R. Montford, C. E., Louisville, Ky.:  
Bridge Specifications, Louisville and Nashville R. R. Co.
- From New York State Library:  
Extension Bulletin No. 1, November, 1891.  
73d Annual Report N. Y. State Library, 1890.
- From Edward P. North, Consulting Engineer, New York:  
19th Annual Report of the Atchison, Topeka and Santa Fé R. R. Co.
- From Ohio Society of Engineers and Surveyors, Massillon, Ohio:  
1st, 2d, 3d and 10th Annual Reports. Charter, Constitution and By-Laws. Code of Rules or Instructions for County Surveyors.
- From Passaic Rolling Mill Co., Paterson, N. J.  
Framed Photograph of the Washington Bridge, N. Y.  
Three framed Photographs of Bridge on D. L. & W. R. R.
- From Publisher's Weekly, N. Y.:  
The Library Journal, No. 5, Vol. XV, and No. 8, Vol. XVI.
- From J. H. Raymond, M. D., Brooklyn, N. Y.:  
Treatment of Sewage by Chlorine.  
The Sanitary Improvement of Stagnant Lakes by the Sea-shore.
- From J. A. Rumrill, Secretary, Springfield, Mass.:  
13th, 21st, 22d, 23d and 24th Annual Reports of the Boston and Albany Railroad Company.
- From Hamilton Smith, Jr., C. E., London, Eng.:  
Half-yearly Report of the El Callao Gold Mining Company, September, 1891.
- From Cady Staley, C. E., Cleveland, Ohio, and Geo. S. Pierson, C. E., Kalamazoo, Mich.:  
The Separate System of Sewage.
- From U. S. Chief of Engineers:  
Report upon the Enforcement of Certain Provisions of the River and Harbor Bill of September 19, 1890.
- From U. S. Department of Agriculture:  
Album of Agricultural Graphics.
- From U. S. Department of State:  
Special Consular Report; Port Regulations in Foreign Countries.  
Report from Consuls No. 132, September, 1891.
- From U. S. Geological Survey:  
10th Annual Report, Parts 1 and 2.  
Bulletin Nos. 62, 65 and 67 to 81 inc.
- From U. S. Navy Department:  
Annual Report of the Chief of the Bureau of Steam Engineering for the year 1891.  
Pilot Chart of the North Atlantic Ocean, December, 1891.  
Transatlantic Steamship Route.
- From U. S. Post Office Department:  
Annual Report of the Postmaster-General for the year ending June 30, 1891.
- From E. D. Worcester, President, N. Y.:  
Annual Reports of Lake Shore and Michigan Southern Railroad Company, 1st to 21st, 1870 to 1891, inclusive.
- From E. Wilder, Secretary, Topeka, Kansas:  
17th and 18th Annual Reports of the Atchison, Topeka and Santa Fé Railroad Company.
- From World's Columbian Exposition:  
Lithograph of Exposition Grounds and Buildings.  
Classification of Department of Transportation Exhibits.  
Various circulars and notices.

AMERICAN SOCIETY  
OF  
CIVIL ENGINEERS.

---

INSTITUTED NOVEMBER 5, 1852.

---

CONSTITUTION AND LIST OF  
MEMBERS.

---

AUGUST, 1891

---

HOUSE OF THE SOCIETY, 127 EAST TWENTY-THIRD STREET,  
NEW YORK.





# CONTENTS.

---

	PAGE
CONSTITUTION .....	5
FORMS REQUIRED BY THE CONSTITUTION.....	16
FORM OF APPLICATION FOR MEMBERSHIP .....	16
FEES, DUES, CERTIFICATE, BADGE .....	21
THE NORMAN MEDAL: CODE OF RULES FOR ITS AWARD.....	22
THE ROWLAND PRIZE: CODE OF RULES FOR ITS AWARD.....	23
ABBREVIATIONS FOR DESIGNATING MEMBERSHIP.....	23
PROVISIONS OF LAWS OF THE STATE OF NEW YORK APPLICABLE TO THE SOCIETY .....	24
LIST OF MEMBERS, 1891.....	29
LIST OF OFFICERS, 1891.....	30
PRESIDENTS OF THE SOCIETY.....	30
HONORARY MEMBERS .....	31
CORRESPONDING MEMBERS.....	31
MEMBERS.....	32
ASSOCIATE MEMBERS.....	82
ASSOCIATES .....	84
JUNIORS.....	88
FELLOWS.....	98
RECAPITULATION.....	100
GEOGRAPHICAL DISTRIBUTION .....	101
IN THE UNITED STATES.....	101
NOT IN THE UNITED STATES.....	114
LIST OF SUBSCRIBERS TO THE BUILDING FUND .....	117
LIST OF SUBSCRIBERS FOR ENLARGEMENT OF SOCIETY ACCOMMODATIONS.....	120
PAST OFFICERS .....	123
LIST OF DECEASED MEMBERS.....	127
GENERAL INFORMATION.....	133



# American Society of Civil Engineers.

---

## CONSTITUTION.

ADOPTED MARCH 4TH, 1891.

---

### ARTICLE I.—NAME, LOCATION AND OBJECT.

1.—The name of this Association shall be THE AMERICAN SOCIETY OF CIVIL ENGINEERS.

2.—The offices of the Society shall be located in the City of New York.

3.—Its objects shall be the advancement of engineering knowledge and practice and the maintenance of a high professional standard among its members.

4.—Among the means to be employed for this purpose shall be: meetings for the presentation and discussion of appropriate papers and for social and professional intercourse; the publication of such papers and discussions as may be deemed expedient; the maintenance of a library, the collection of maps, drawings and models, and the establishment of facilities for their use.

### ARTICLE II.—MEMBERSHIP.

1.—The Corporate Members of this Society shall be designated as Members and Associate Members. There may also be connected with the Society, Honorary Members, Associates, Juniors, Fellows and Subscribers, who shall be entitled to all the privileges of the Society, except the right to vote and to hold office therein; provided that Honorary Members elected from the Corporate Members of the Society shall retain their right to vote and to hold office.

2.—A Member shall be a Civil, Military, Naval, Mining, Mechanical, Electrical, or other professional Engineer, an Architect or a Marine Architect. He shall be at the time of admission to membership not less than thirty years of age, and shall have been in the active practice of his profession for ten years; he shall have had responsible charge of work for at least five years, and shall be qualified to design as well as to direct engineering works. Graduation from a school of engineering of recognized reputation shall be considered as equivalent to two years' active practice. The performance of the duties of a Professor of Engineering in a technical school of a high grade, shall be taken as an equivalent to an equal number of years of actual practice.

3.—An Associate Member shall be a professional Engineer or Architect not less than twenty-five years of age, who shall have been in the active practice of his profession for at least six years, and who shall have had responsible charge of work as principal or assistant for at least one year. Graduation from a school of engineering of recognized reputation shall be considered as equivalent to two years' active practice.

4.—Any person having the necessary qualifications prescribed in this article to entitle him to admission to the grades of Member or Associate Member, shall be eligible for such membership, though he may not be practicing his profession at the time of making his application.

5.—An Associate shall be a person who, by scientific acquirements or practical experience, has attained a position in his special pursuit qualifying him to co-operate with engineers in the advancement of professional knowledge and practice, but who is not a professional engineer.

6.—A Junior shall be not less than eighteen years of age, and his connection with the Society shall cease when he becomes thirty years of age, unless he be previously transferred to another grade. He shall have had active practice in some branch of engineering for at least two years, or he shall have graduated from a school of engineering of recognized standing. He shall state in his application for membership that he intends to become or to continue to be an engineer. Persons who are in the Junior class at the time of the adoption of this Constitution shall not have their status changed by the provisions of this section.

7.—Honorary Members shall be chosen only from persons of acknowledged eminence in some branch of engineering or the sciences related thereto. There shall not be more than twenty at any one time.

8.—Fellows shall be contributors to the permanent funds of the Society, who may not be eligible for admission as Corporate Members.

9.—There may also be admitted to association with the Society as Subscribers, persons not less than twenty-one years of age who are not eligible for admission to any grade of membership otherwise provided for.

### ARTICLE III.—ADMISSIONS AND EXPULSIONS.

1.—Honorary Members shall be proposed by at least ten Members, and shall be elected by a unanimous vote of the Board of Direction and such Past Presidents of the Society as shall be at the time Members and resident in North America. A Past President, or a member of the Board of Direction proposed for Honorary Membership, shall not be required to vote either for or against his own admission.

A person elected an Honorary Member shall be promptly notified thereof by letter. The election shall be canceled if an acceptance is not received within six months after the mailing of such notice.

2.—An application for admission to the Society as Member or as Associate Member, or for transfer from the lower to the higher grade, or for transfer from any other grade to either grade of Corporate Membership, shall embody a concise statement, with dates, of the candidate's professional training and experience; and shall be in a form and in such detail



as may be prescribed by the Board of Direction. It shall be signed by the applicant, and shall contain a promise to conform to the requirements of membership, if elected. The applicant shall give at least five references, who shall be Corporate Members in good standing, who shall each be requested by the Secretary to sign and forward a letter to the Board of Direction stating the extent of his knowledge of the applicant and of his qualifications, certifying that he knows the applicant personally and believes him to be in all respects a proper person to be admitted into the Society.

Applications of engineers not resident in North America, and who may be so situated as not to be personally known to five Corporate Members, may be recommended for ballot by members of the Board of Direction, after having secured evidence sufficient, in their opinion, to show that the applicant is worthy of admission.

3.—At stated periods, to be determined by the Board of Direction, there shall be issued to each member in any grade whose address is known, a list of all new applications received for membership in any grade or for transfer from one grade to another, which list shall be dated and shall contain a concise statement of the record of each applicant and the names of the references or endorsers, with a request that members transmit to the Board any information in their possession which may affect the disposition of the applications. Not less than twenty days after the issue of such list, the Board of Direction shall consider these applications, together with any information in regard to the applicants that may have been received; may make further inquiries, if deemed expedient; may classify the applicant with his consent, and on applications for Corporate Membership may direct a ballot.

4.—The ballots shall be letter-ballots, in a form to be prescribed by the Board of Direction. They shall be mailed to each Corporate Member whose address is known, and shall state the date on which the ballot is to be canvassed, which shall be not less than twenty days after the issue of the ballot. Seven or more negative votes shall exclude from election. In case of exclusion no notice thereof shall be entered on the minutes, but the candidate shall be notified.

5.—The Board of Direction, upon receipt of letters from not less than eight Corporate Members in good standing, requesting a reconsideration of the ballot on any excluded candidate and stating the reasons for such request, shall consider these reasons, and if the Board deems them sufficient, it shall cause a notice to be mailed to each Corporate Member whose address is known, giving the name and record of the applicant, and the names of those who ask a reconsideration. This notice shall include a request that any member having information which might aid in a proper consideration of the application, will at once transmit such information to the Board of Direction.

Not less than twenty days after the issue of this notice, the Board shall again consider the request with any additional information that may have been received, and it may continue the inquiry so as to secure the fullest information. If the Board decides that the reasons for a reconsideration are sufficient, it shall order another ballot to be taken. A letter-ballot in a form to be prescribed by the Board shall then be mailed to each Corporate Member whose address is known; and the vote thereon shall be canvassed at a meeting

held not less than twenty days after its issue. Negative ballots to the number of 10 per cent. of the votes cast shall exclude.

The request for reconsideration of a ballot must be presented within one year after the date of the original canvass of such ballot.

6.—An application for admission as Associate, Junior, Fellow, or Subscriber, shall be in a form to be prescribed by the Board of Direction; shall embody a statement of the applicant's qualifications for the grade of membership to which admission is sought and a promise to conform to its requirements. The application shall be signed by the applicant, and it shall be indorsed by at least three Corporate Members, who shall certify that they personally know the applicant, that they believe him to be in all respects a proper person to be admitted to the Society, and that they recommend him for admission.

7.—The Board of Direction, after making such inquiries as it may deem expedient, shall have the power to elect persons so proposed, as Associates, Juniors, Fellows, or Subscribers; and shall notify the membership of its action.

8.—All elected candidates shall be duly notified and shall subscribe to the Constitution and Rules of the Society. Forms for these purposes shall be prescribed by the Board of Direction. If these provisions are not complied with within six months from the notification of election, such election shall be considered void, unless for special reason the time shall be extended by the Board of Direction.

Membership of any person shall date from the day of his election.

9.—Upon the written request of ten or more Corporate Members, that for cause therein set forth, a person belonging to the Society be expelled, the Board of Direction shall consider the matter, and if there appears to be sufficient reason, shall advise the accused of the charges against him. He may, if he so desires, present a written defense which shall be considered at a meeting of the Board of Direction, of which he shall receive due notice. Not less than two months after such meeting, the Board of Direction shall finally consider the case, and if resignation has not been tendered, or a defense made which is satisfactory to the Board, it shall then notify the person that he will be expelled in one month, unless he elects to appeal from this decision. Appeals will be submitted to the Corporate Members by letter-ballot in a form to be prescribed by the Board of Direction. The ballot shall be accompanied by a statement of the charges, and of the action of the Board thereon, with such information as it deems proper, and also the statement of the person making the appeal. The ballot shall be canvassed by the Board not less than twenty days after its issue. A majority of the ballots cast will be required to sustain the action of the Board. The Board will notify the person and the Corporate Members of the result of the ballot. In case no appeal be made, the Board of Direction will expel the person, and notify him and the Corporate Members of its action.

10.—A member of any grade in the Society may resign his membership by a written communication to the Secretary, who shall present the same to the Board of Direction; when, if all his dues have been paid, his resignation shall be accepted.

11.—All persons elected and duly qualified, whose address on the records of the Society is within fifty miles of the Post Office in the City of New

York shall be deemed Resident, and those whose address is beyond that limit shall be deemed Non-Resident.

The classification of each person for the fiscal year as Resident or Non-Resident, shall be determined by the Records of the Society as they may appear on January 1st of that year.

#### ARTICLE IV.—DUES.

1.—The entrance fees payable on admission to the Society shall be as follows: by Members, thirty dollars; Associate Members, twenty-five dollars; Associates, twenty dollars; Juniors, ten dollars; Subscribers, ten dollars.

2.—The annual dues payable by members, whether Resident or Non-Resident, shall be as follows: by Corporate Members, fifteen dollars; Associates, ten dollars; Juniors, ten dollars; and Subscribers, ten dollars.

3.—In addition to the dues prescribed in the preceding section, each resident member shall pay annually as follows: Corporate Members, ten dollars; Associates, Juniors and Subscribers, five dollars.

4.—A person transferred from any grade to a higher one shall pay the difference between the entrance fees of the two grades, and his annual dues shall be those of the higher grade.

5.—The annual contributions shall become due for the ensuing year on the first day of January, and shall be payable in advance. It shall be the duty of the Secretary to notify each Member of the amount due for the ensuing year at the time of giving notice of the annual meeting.

6.—Persons elected after six months of any fiscal year shall have expired shall pay only one-half of the amount of dues for that fiscal year.

7.—All future annual dues may be compounded by a single payment by a Corporate Member of \$250; or by an Associate or Subscriber of \$150. Should a compounding Associate or Subscriber be elected to Corporate Membership he shall pay the further sum of \$100.

Provided, That all compounding Corporate Members, Associates or Subscribers who may be or hereafter become Resident, shall be and remain liable for the annual payment of the difference between the annual dues of Resident and Non-Resident Corporate Members, Associates or Subscribers; but any Corporate Member may at any time compound for the future payment of all annual dues of every nature and kind by the payment of \$75 in addition to the \$250 hereinbefore named; and any Associate or Subscriber may at any time compound for the future payment of all annual dues as Associate or Subscriber by the payment of \$40 in addition to the \$150 hereinbefore named.

Provided, that any person desiring to compound for future dues shall have paid his entrance fee, all arrears of dues, and the annual dues for the current year, before the compounding sum may be available.

Persons compounding shall sign an agreement that they will be governed by the Constitution and Laws of the Society as they are now formed, or as they may be hereafter altered, amended or enlarged; and that in case of their ceasing to be connected with the Society from any cause whatever, the amount theretofore paid by them for compounding, and for entrance fees and annual dues, shall be the property of the Society.

All moneys thus paid in commutation of annual dues shall be invested as a permanent fund, only the interest thereupon being subject to appropriation for current expenses.

8.—Any person whose dues are more than three months in arrears shall be notified by the Secretary. Should his dues not be paid when they become six months in arrears he shall lose the right to vote or to receive the publications of the Society. Should his dues become nine months in arrears, he shall again be notified in form prescribed by the Board of Direction, and if such dues become one year in arrears, he shall forfeit his connection with the Society. The Board of Direction, however, may, for cause deemed by it sufficient, extend the time for payment and for the application of these penalties.

9.—The Board of Direction may, for sufficient cause, temporarily excuse from payment of annual dues any member who from ill-health, advanced age, or other good reason assigned, is unable to pay such dues; and the Board may remit the whole or part of dues in arrears, or accept, in lieu thereof, desirable additions to the Library, or collections.

10.—Every person admitted to the Society shall be considered as belonging thereto and liable for the payment of all dues until he shall have resigned, been expelled, or have been relieved therefrom by the Board of Direction.

11.—Persons elected as Fellows shall become such upon the payment of Two Hundred and Fifty dollars into the permanent funds of the Society. They shall not be liable for other fees and dues.

12.—The status of any present subscribers shall not be changed by the provisions of this Constitution.

#### ARTICLE V.—OFFICERS.

1.—The Officers of the Society shall be: A President, four Vice-Presidents, eighteen Directors, a Secretary, and a Treasurer; who, with all living Past Presidents of the Society who continue to be Members, shall constitute the Board of Direction, in which the government of the Society shall be vested, and who shall be the Trustees as provided for by the laws under which the Society is organized.

2.—The terms of office of the President, Secretary and Treasurer shall be one year; of the Vice-Presidents, two years; and of the Directors, three years. Provided, however, that at the first election after the adoption of this Constitution, four Vice-Presidents and eighteen Directors shall be elected, of whom two Vice-Presidents and six Directors shall be elected to serve for one year only, and six Directors for two years only; provided, also, that after the first election two Vice-Presidents and six Directors shall be elected each year.

The term of each officer shall begin at the close of the Annual Meeting at which such officer is elected, and shall continue for the period above named or until a successor is duly elected.

3.—A vacancy in the office of President shall be filled by the Senior Vice-President.

A vacancy in the office of Vice-President shall be filled by the senior Director. Seniority between persons holding similar offices shall be determined by priority of election to the office; and when these dates are the same, by priority of admission to Corporate Membership; and when the latter



dates are identical, the selection shall be made by lot. In case of the disability or neglect in the performance of his duty, of any officer of this Society, the Board of Direction shall have power to declare the office vacant. Vacancies in any office for the unexpired term shall be filled by the Board of Direction, except as provided above.

4.—The President shall be ineligible for re-election. The Vice-Presidents and Directors shall not be eligible for re-election to the same office, until at least one full term shall have elapsed after the end of their respective terms.

5.—At least one Vice-President, the Secretary and the Treasurer, and six Directors shall be Resident Corporate Members during their term of office.

#### ARTICLE VI.—MANAGEMENT.

1.—The President shall have a general supervision of the affairs of the Society. He shall preside at meetings of the Society and of the Board of Direction at which he may be present, and shall be *ex-officio* member of all committees. He shall deliver an address at the Annual Convention.

The Vice-Presidents in order of seniority shall preside at meetings in the absence of the President, and discharge his duties in case of a vacancy in the office.

2.—The Board of Direction shall manage the affairs of the Society in conformity to the laws under which the Society is organized and the provisions of this Constitution. It shall direct the investment and care of the funds of the Society; make appropriations for specific purposes; act upon applications for membership as heretofore provided; take measures to advance the interests of the Society; appoint all its employees; and generally direct its business. The Board of Direction shall make an annual report at the Annual Meeting, transmitting the report of the Treasurer and of other officers, and of Committees.

3.—The Treasurer shall receive all moneys and deposit the same in the name of the Society. He shall invest all funds not needed for current disbursements, as shall be ordered by the Board of Direction. He shall pay all bills, when certified and audited, as provided by this Constitution and by rules to be prescribed by the Board of Direction. He shall make an annual report and such other reports as may be prescribed by the Board of Direction. The accounts and financial books of the Society shall be examined annually by an expert accountant to be selected by the Board of Direction.

The Board of Direction shall secure a satisfactory surety for the faithful performance of his duties by the Treasurer, and shall renew the same during the month of January of each year.

4.—The Secretary shall be, under the direction of the President and Board of Direction, the executive officer of the Society.

He will be expected to attend all meetings of the Society and of the Board of Direction; prepare the business therefor, and duly record the proceedings thereof.

He shall see that all moneys due the Society are carefully collected, and without loss transferred to the custody of the Treasurer.

He shall carefully scrutinize all expenditures, and use his best endeavor to secure economy in the administration of the Society.



He shall personally certify the accuracy of all bills or vouchers on which money is to be paid, and shall countersign the checks drawn by the Treasurer against the funds of the Society, when such drafts are known to him to be proper and duly authorized by the Board of Direction.

He shall conduct the correspondence of the Society and keep full records of the same.

He shall have charge of the Society's house and its contents; shall supervise the work of all employés of the Society, and see that they diligently perform their respective duties.

He shall perform all other duties which may from time to time be assigned to him by the Board of Direction.

5.—An Assistant Secretary, who shall also be Librarian, shall be appointed by the Board of Direction and shall aid the Secretary and be under his immediate direction in all matters. His whole time shall be given to the Society.

6.—An Auditor shall also be appointed by the Board of Direction, who shall have entire charge of the books of account of the Society, and shall furnish monthly to the Board of Direction a statement of receipts and expenses under their several headings, and also a statement of monthly balances.

He shall present annually to the Board of Direction a balance sheet of his books, as of the 31st December, and shall furnish from time to time such other statements as may be required of him.

7.—The Secretary and Treasurer shall be paid salaries to be determined by the Board of Direction; but such salaries shall not be reduced during the term of office, as provided in this Constitution. All other salaries shall be fixed, from time to time, by the Board of Direction.

8.—The Board of Direction shall meet within twenty days after the Annual Meeting, and shall then appoint from its members a Finance Committee of five, a Library Committee of five, and a Committee on Publications of five. At least three members of the Finance Committee, and two members of the other Committees, shall be resident within fifty miles of New York.

These Committees shall report to the Board of Direction, and perform their duties under its supervision.

9.—The Finance Committee shall have immediate supervision of the accounts and financial affairs of the Society, shall approve all bills before payment, and shall make recommendations to the Board of Direction as to the investment of moneys and as to other financial matters.

10.—The Library Committee shall have general supervision of the Library and the House of the Society and the property therein; shall make recommendations to the Board with reference thereto, and shall direct the expenditure for books and other articles of permanent value, of such sums as may be appropriated for these purposes.

11.—The Committee on Publications shall have general supervision of the publications of the Society, and of contracts and expenditures connected therewith.

12.—In the consideration of papers offered for presentation, those papers containing matter readily found elsewhere, those specially advocating personal interests, those carelessly prepared or controverting established facts, and those purely speculative or foreign to the purposes of the Society, shall be

rejected. The Committee on Publications shall determine which papers shall be read in full, and which shall be printed after reading by title only. The Committee may return a paper to the writer for correction and emendation, and call to its aid one or more members of special experience relating to the subject treated, either to advise on the paper or to discuss it. Such papers as in the judgment of the Committee should appear in the *Transactions*, shall promptly, upon their acceptance, be printed and distributed to Members of all grades; others shall, with the consent of the authors, be suitably indexed and filed for reference, or the Committee may provide abstracts thereof, which, when approved by the authors, may be published instead of the original papers. Advance copies of papers and discussions may be sent out to the membership before final publication.

13.—Special committees to report upon engineering subjects shall be authorized only by a majority of the votes cast by the Society, and in the following manner: A proposition to appoint such a Committee shall be presented at a regular meeting of the Society, and if sustained, on a motion to refer the same to the Board of Direction, by an affirmative vote of not less than twenty-five Corporate Members, it shall be so referred.

The Board of Direction shall then consider the same and report its recommendations to the Society at the next general business meeting, together with a statement of the arguments for and against the appointment of such Committee.

If a motion for the issue of a letter-ballot thereon receive the affirmative vote of two-thirds of the Corporate Members present, the Board of Direction shall, within thirty days thereafter, issue the letter-ballot, accompanied by a statement of the arguments for and against the proposition.

A majority of a total vote of not less than one-third of the Corporate Membership of the Society shall be necessary for its adoption, whereupon the Committee so authorized shall be appointed by the Board of Direction.

#### ARTICLE VII.—NOMINATION AND ELECTION OF OFFICERS.

1.—At the Business Meeting of the Annual Convention, seven Corporate Members, not officers of the Society, shall be appointed by the meeting, who with the five last living Past Presidents of the Society shall be the Nominating Committee. This Committee shall present to the Board of Direction, on or before the first day of October ensuing, a list of nominations for the offices to be filled at the next Annual Election. These nominations shall be so made, as to provide, with the officers holding over, a Resident Vice-President and six Resident Directors.

Directly after the first of October this list shall be mailed to all Corporate Members of the Society; provided that if any person shall be found by the Board of Direction to be ineligible for the office for which he is nominated, or should a nominee decline such nomination, his name shall not be sent out, but the Board of Direction shall substitute another name therefor.

At any time previous to the first day of December any ten or more Corporate Members may send to the Secretary additional nominations, signed by such Members.

Should the nominations made not include a sufficient number of Resident Members to comply with the requirements of this Section, the Board of Direction shall add names of Resident Members sufficient to comply therewith.

At least thirty days previous to the Annual Meeting there shall be mailed to every Corporate Member whose address is known, a letter-ballot with envelopes for voting. This ballot shall include all the nominations made in accordance with this article. The names and residences of nominees and their grades of membership shall be given ; all the names for any one office being arranged alphabetically, and without distinguishing marks of any kind, except that the names of Residents and Non-Residents shall be in separate groups and shall be so designated.

Members voting may erase names from the printed ballot list, and may substitute the name or names of any other person or persons eligible for any office. But the number of names for each office on the ballot voted must not exceed the number to be elected at that time to such office, and the vote must be for the proper number of Resident and Non-Resident officers. Ballots not in accordance with these provisions must be rejected.

Directions in accordance with these provisions shall be issued with the ballots.

2.—Ballots may be sent by mail to the Secretary, or may be presented to him at the Society House. They may be enclosed in two sealed envelopes. The outer envelope shall be endorsed by the voter's signature.

The Secretary shall make from the endorsements on the outer envelopes a list of the voters from whom ballots are received, which list shall be open to inspection by all Corporate Members. A voter may change his vote by written request.

3.—The poll shall be closed at 12 o'clock noon on the first day of the Annual Meeting, and the ballots shall be canvassed publicly by tellers appointed by the presiding officer.

The persons voted for, for each office, Resident and Non-Resident, to the number of each class to be elected, who shall receive the highest number of votes, shall be declared elected.

In case of a tie between two or more candidates for the same office, the Annual Meeting shall elect the officer from among the candidates so tied.

The presiding officer shall announce to the meeting the names of the officers elected in accordance with this section.

#### ARTICLE VIII.—MEETINGS.

1.—A Convention of the Society for the reading and discussion of professional papers and for social intercourse shall be held annually at such time and place as the Society may determine.

2.—There shall be two general Business Meetings of the Society each year : the Annual Meeting, which shall be held at the offices of the Society on the third Wednesday in January, and at which the annual reports for the year ending December 31st previous shall be presented, and the ballot for officers canvassed ; and a Business Meeting during the Annual Convention, which shall be held at a time and place to be determined by the Board of Direction.

At these meetings thirty Corporate Members shall constitute a quorum.

3.—Business Meetings shall be held monthly on the first Wednesday of each month, except during the months of July and August. At these meetings thirty Corporate Members shall constitute a quorum.

4.—In addition to the Annual Meeting and the Annual Convention, meetings for the reading and discussion of papers shall be held as ordered by the Board of Direction.

5.—Special Meetings may be called by the Board of Direction, and *shall* be so called on the request of thirty Corporate Members, which request shall state the purpose of such meeting. The call for such meetings shall be issued ten days in advance, and shall state the purpose thereof, and no other business shall be taken up at such meeting. At these meetings thirty Corporate Members shall constitute a quorum.

6.—The Society may adopt, from time to time, rules for the order of business at its meetings.

7.—Meetings of the Board of Direction shall be held at the time of the Annual Meeting and of the Annual Convention, at which meetings nine Members shall constitute a quorum; and at such other times as the Board may determine, at which five Members shall constitute a quorum.

#### ARTICLE IX.—AMENDMENTS.

1.—Proposed amendments to this Constitution must be reduced to writing and signed by not less than five Corporate Members, and be submitted and acted upon as follows :

2.—Amendments presented to the Secretary on or before the first Wednesday in November shall be sent by letter to the several Corporate Members of the Society at least twenty-five days previous to the Annual Meeting. Such amendments shall be in order for discussion at such Annual Meeting, and may be amended in any manner pertinent to the original amendments by a majority vote of the Annual Meeting, and if so amended shall be voted upon by letter-ballot in form as amended by the Annual Meeting; if not so amended, they shall be voted upon by letter-ballot as submitted. The vote to be counted at the first regular meeting in March.

3.—Amendments presented to the Secretary not less than sixty days previous to the date of the Annual Convention, shall be sent by letter to the several Corporate Members of the Society at least twenty-five days previous to the Annual Convention. Said amendments shall be in order for discussion at the Business Meeting during such Annual Convention, and may be amended in any manner pertinent to the original amendments by a majority vote of the Business Meeting during the Annual Convention, and if so amended, shall be voted upon by letter-ballot in form as amended by said Business Meeting; if not so amended, they shall be voted upon by letter-ballot as submitted. The vote to be counted at the first regular meeting in October.

4.—If, after discussion of a proposed amendment, at either of the general meetings of the Society, the meeting shall so decide by a majority vote, it may refer the amendment to a Committee for further consideration, which Committee shall report at the next general meeting, whereupon the amendment shall be voted upon as hereinbefore provided.

5.—An affirmative vote of two-thirds of all ballots cast shall be necessary to the adoption of any amendment.

Amendments so adopted shall take effect thirty days after their adoption, provided that the officers of the Society, at the time any amendment may be adopted, shall continue in office until the next Annual Election.



## FORMS REQUIRED BY THE CONSTITUTION.

[Form No. 1.]

## FORM OF APPLICATION.

An Application for Membership in any grade, or for transfer from a lower to a higher grade, shall contain a statement, over the *candidate's signature*, of his *age, residence*, the nature and term of his *professional service*, and that he will conform to the requirements of membership if elected.

## STATEMENT.

I [*Full Christian names and surname of candidate*] residing at [*City or town, county, state*] being desirous of admission into the American Society of Civil Engineers as [*State class of membership*] submit the following as my professional record:

I was born at [*Place of birth*] on [*Date of birth*] 18 , [*This must embody for all classes of members,\* except Fellows, a concise narrative, with dates, of the candidate's professional career, specifying the positions he has held, the nature and extent of the works in or upon which he has been engaged, giving an idea of their magnitude and importance. All proper names, names of railroads, etc., must be written without abbreviation.*]

[*Finally state present professional engagement or occupation.*]

FOR MEMBER, ASSOCIATE MEMBER, JUNIOR, ASSOCIATE OR FELLOW.

I will conform to the requirements of membership, if elected as [*State class of membership*].

[*The applicant will sign here his regular signature, and give his present post-office address.*]

Dated, ..... 18

(A.) In case the Application be for Corporate Membership, fill out the following:

I hereby give as references to my standing as a man and an engineer the following gentlemen:

[*Give the names and full address of at least five Corporate Members.*]

(B.) If the Application be for the grade of Associate, Junior or Fellow, have the following filled out:

On the grounds stated, and because we believe him from personal knowledge to be in all respects a proper person to be admitted into the American Society of Civil Engineers, we hereby recommend [*Full name of candidate*] of [*Residence of candidate*] for election as [*Class of membership*].

[*To be signed by at least three Corporate Members of the Society, personally acquainted with the applicant.*]

[Blank forms are furnished on application to the Secretary.]

\* Applications for Fellowship shall contain a brief statement of the applicant's age, business career and reputation, signed by three proposers and the applicant.



[FORM No. 2.]

## AMERICAN SOCIETY OF CIVIL ENGINEERS.

NEW YORK,.....

DEAR SIR:

Mr.....having made application for admission as..... in the American Society of Civil Engineers, refers to you for information as to his character and professional career, and his reputation as an engineer. Will you kindly transmit to the Board of Directors, in writing, any information you may have as to the character and professional career of the applicant, his reputation as an engineer and a gentleman, the character of work of which he has had charge, and the duration of such charge, with any facts which will aid in the final consideration of the application. If you are willing to become his endorser, it is necessary that you shall sign and forward to the Board of Direction a letter, stating the extent of your knowledge of the applicant and of his qualifications, and certifying that you know him personally and believe him to be in all respects a proper person to be admitted into the Society.

The application will probably be considered by the Board on.....

Yours very truly,

.....Secretary.

Form No. 3 is the preliminary notice or blue list to be issued (in advance of the ballot list) to all members.

[FORM No. 4.]

## AMERICAN SOCIETY OF CIVIL ENGINEERS.

NEW YORK,.....

DEAR SIR:

The Board of Direction, having examined the record given by Mr. ....in an application for admission to this Society as..... desires more exact information respecting his character and professional career, his reputation as an engineer and a gentlemen, the nature and extent of the works upon which he has been engaged, and to what extent he has had charge of such work, together with the duration of such charge.

I am requested by the Board to write you for such further information as you can give, to aid it in arriving at a proper decision on the application.

Yours truly,

.....Secretary.

[FORM No. 5.]

## AMERICAN SOCIETY OF CIVIL ENGINEERS.

NEW YORK,.....

DEAR SIR:

The Board of Direction having considered your application for admission to this Society, reports from the information contained in the statement of professional services submitted, that under the Constitution you are eligible as....., and if this classification is accepted by you a ballot will be ordered.

Please express upon the annexed blank your consent, or give reasons why the application should be reconsidered.

Respectfully,

..... *Secretary.*

IF CLASSIFICATION IS ACCEPTED, SIGN THIS FORM.

I accept the classification of .....  
and if elected, will conform to the requirements of membership.

Respectfully,

..... *Applicant.*

.....  
Place. Date.

IF CLASSIFICATION IS NOT ACCEPTED, FILL OUT AND SIGN FORM.

I ask that the above classification be reconsidered for the following reasons:

[Here state reasons.]

..... *Applicant.*

.....  
Place. Date.

Form No. 6 is the ballot list to be issued to all Corporate Members only.

[FORM No. 7.]

AMERICAN SOCIETY OF CIVIL ENGINEERS.

NEW YORK, .....

DEAR SIR:

I have the pleasure to inform you that on the ..... day of ..... you were elected a ..... of the American Society of Civil Engineers.

To confirm this election, it is necessary, under Article III, Section 8 of the Constitution, for you to subscribe the enclosed obligation, and to pay to the Society, the prescribed fee as stated in the enclosed bill.

Respectfully,

..... *Secretary.*

[FORM No. 8.]

I, the undersigned, having been duly elected a ..... of THE AMERICAN SOCIETY OF CIVIL ENGINEERS, do hereby promise that I will be governed by its Constitution, as it now exists, or as it may be amended, and that I will aid the objects of the said Society by *furnishing papers and discussions*, and attending the meetings thereof as often as I conveniently can; provided that whenever I shall signify in writing to the Secretary that I am desirous of withdrawing therefrom, I shall (after the discharge of my indebtedness to the Society), be free from this obligation.

Witness my hand, this ..... day of ..... 18

.....

[FORM No. 9.]

AMERICAN SOCIETY OF CIVIL ENGINEERS.

NEW YORK,.....

DEAR SIR:

Under the provisions of the Constitution, it becomes my duty as Secretary of the American Society of Civil Engineers, to notify you that by the ballot on your application for.....canvassed.....you failed of election to the Society.

Yours truly,

.....Secretary.

[FORM No. 10.]

AMERICAN SOCIETY OF CIVIL ENGINEERS,

NEW YORK,.....

DEAR SIR:

Under the provisions of the Constitution, it becomes my duty as Secretary of the American Society of Civil Engineers, to notify you that at a meeting of the Board of Direction, held....., a ballot was taken on your application for.....and you failed of election to the Society.

Yours truly,

.....Secretary.

[FORM No. 11.]

AMERICAN SOCIETY OF CIVIL ENGINEERS,

NEW YORK,.....

Notice is hereby given that in accordance with Article III, Section 5 of the Constitution, a reconsideration of the ballot on.....has been asked for by eight Corporate Members in good standing, stating the reason for such request; and that the Board of Direction has considered these reasons, and deem them sufficient to demand further investigation. The name and record of the applicant are sent herewith, and you are requested to transmit at once to the Board any information you may have as to the character and professional career of the applicant, his reputation as an engineer and gentleman, the character of work of which he has had charge, with any other facts which will aid it in a proper consideration of this application.

The Board will take final action.....18

.....Secretary.

[FORM No. 12.]

AMERICAN SOCIETY OF CIVIL ENGINEERS,  
 NEW YORK, .....

DEAR SIR:

The Board of Direction of the American Society of Civil Engineers has instructed me to inform you that you have been in arrears since.....  
 Your present indebtedness is \$....., and your attention is called to the provisions of the Constitution quoted below.\*

Respectfully,

..... Secretary.

[FORM No. 13.]

AMERICAN SOCIETY OF CIVIL ENGINEERS,  
 NEW YORK, .....

DEAR SIR:

The Board of Direction of the American Society of Civil Engineers has instructed me to inform you that you have been in arrears since.....  
 Your present indebtedness is \$ ....., and by the provisions of Article IV, Section 8, of the Constitution quoted below, unless the same be paid within three months from the date of this notice, you will forfeit your connection with the Society.

Your attention is called to the provisions of the Constitution which are quoted below.

I trust the matter will receive your prompt attention.

Respectfully,

..... Secretary.

---

\* The provisions of the Constitution referred to are found in Article III, Secs. 5, 6 and 8.

## FEES, DUES, CERTIFICATE, BADGE.

ORDINARY FEES AND DUES.	RESIDENT.				NON-RESIDENT.			
	Members.	Associate Members.	Associates.	Juniors.	Members.	Associate Members.	Associates.	Juniors.
Entrance Fee.....	\$30.00	\$25.00	\$20.00	\$10.00	\$30.00	\$25.00	\$20.00	\$10.00
Yearly Assessment....	25.00	25.00	15.00	15.00	15.00	15.00	10.00	10.00
Total, payable upon Election.....	\$55.00	\$50.00	\$35.00	\$25.00	\$45.00	\$40.00	\$30.00	\$20.00

Annual Contributions are due on the 1st day of January, and are payable in advance.

Persons elected members, after six months of any fiscal year have expired, pay only one-half of the amount of dues for that fiscal year, otherwise required.

Fellowship fee \$250 in one payment for life.

**PROVISIONS FOR COMPOUNDING DUES.**—All future annual dues may be compounded by a single payment by a Corporate Member of \$250; or by an Associate or Subscriber of \$150. Should a compounding Associate or Subscriber be elected to Corporate Membership he shall pay the further sum of \$100.

Provided, that all compounding Corporate Members, Associates or Subscribers who may be or hereafter become Resident, shall be and remain liable for the annual payment of the difference between the annual dues of Resident and Non-Resident Corporate Members, Associates or Subscribers; but any Corporate Member may at any time compound for the future payment of all annual dues of every nature and kind by the payment of \$75 in addition to the \$250 hereinbefore named; and any Associate or Subscriber may at any time compound for the future payment of all annual dues as Associate or Subscriber by the payment of \$40 in addition to the \$150 hereinbefore named.

Provided, that any person desiring to compound for future dues shall have paid his entrance fee, all arrears of dues, and the annual dues for the current year, before the compounding sum may be available.

Persons compounding shall sign an agreement that they will be governed by the Constitution and Laws of the Society as they are now formed, or as they may be hereafter altered, amended or enlarged; and that in case of their ceasing to be connected with the Society from any cause whatever, the amount theretofore paid by them for compounding, and for entrance fees and annual dues, shall be the property of the Society.

**CERTIFICATES OF MEMBERSHIP.**—The prices, to cover cost of Certificates, are as follows:

Parchment .....	\$2.25
Parchment Paper.....	1.25
Plate Paper .....	1.25

**BADGE.**—This is of gold and enameled, with the member's name and a number engraved on the back, and is mounted either as an ordinary pin, a scarf pin, or a watch charm, as directed. The price is five dollars, which includes engraving the name and number. Badges can be secured only by means of an order signed by the Secretary.

**REMITTANCES.**—All remittances should be made payable to the order of the American Society of Civil Engineers. They should be in drafts on New York, or in Postal Money Orders payable at the New York Post Office (not at a branch office).



## THE NORMAN MEDAL.

## CODE OF RULES FOR ITS AWARD.

I.—Competition for the Norman Medal of the American Society of Civil Engineers shall be restricted to members of the Society.

II.—There shall be one gold medal, and only one, struck for each and every fiscal year of the Society, and awarded as hereinafter provided. The dies therefor shall be with the Superintendent of the United States Mint at Philadelphia, in trust exclusively for the above purpose. Such medal shall be of a cost equal to the annual interest received upon \$1,000 of the Consolidated Stock of the City of New York, Certificate No. 179, of the additional new Croton Aqueduct Stock of the City of New York, authorized by an Act of the Legislature of the State of New York, Chap. 230, passed April 15, 1870, dated November 17, 1873, now held in trust by the Treasurer of this Society, and so held solely for this purpose, and shall be executed upon his order.

III.—All original papers presented to the Society by Members of any class, during the year for which the medal is awarded, shall be open to the award, provided that such papers shall not have been previously contributed in whole or in part to any other association, nor have appeared in print prior to their publication by the Society, nor have been presented to the Society in any previous year.

IV.—The Board of Censors to award the medal shall consist of three Members of the Society, to be designated by the Board of Direction. The Secretary of the Society shall act as Secretary to the Board of Censors.

V.—The medal shall be awarded to such paper as the said Board shall judge to be worthy of special commendation for its merits as a contribution to engineering science, not merely relatively as compared with others presented during the same years, but as exhibiting the science, talent or industry displayed in the consideration of the subject treated of, and for the good which may be expected to result from the discussion and the inquiry.

VI.—In case no paper presented during the year shall be deemed of sufficient value to receive an award, the amount of the interest of the fund for that year shall be expended by the Board of Direction in the purchase of books to be offered as a premium for the second best paper in the next year in which more than one paper of sufficient value may be presented.

VII.—The medal year shall terminate on the first day of August, and the award shall be announced at the annual meeting.

VIII.—The Treasurer of this Society shall cause the medal to be prepared and delivered to, or deposited to the order of, the successful competitor, within two months after the annual meeting at which the same shall have been awarded.

## THE ROWLAND PRIZE.

---

### CODE OF RULES FOR ITS AWARD.

Not more than one prize shall be awarded each year for papers prepared during the year. The year shall terminate on the first day of August, and the award shall be announced at the annual meeting.

The prize shall consist of fifty dollars in cash.

The award shall be made by a committee consisting of the Secretary and two Members of the Society, to be appointed by the Board of Direction.

The prize shall be awarded to such paper as the committee deem most worthy of such recognition, the preference being given to papers describing in detail accomplished works of construction, their cost and manner of execution, and the errors in design and execution.

---

### ABBREVIATIONS FOR DESIGNATING MEMBERSHIP.

---

The Board of Direction has declared the following as the authorized abbreviations to be used by Members of the Society having occasion to designate themselves as such :

FOR HONORARY MEMBERS,	-	-	Hon. M. Am. Soc. C. E.
FOR MEMBERS,	-	-	M. Am. Soc. C. E.
FOR ASSOCIATE MEMBERS,	-	-	A. M. Am. Soc. C. E.
FOR ASSOCIATES,	-	-	Assoc. Am. Soc. C. E.
FOR JUNIORS,	-	-	Jun. Am. Soc. C. E.
FOR FELLOWS,	-	-	F. Am. Soc. C. E.

The Board of Direction requests the use of the above forms in all cases.

PROVISIONS OF THE LAWS OF THE STATE OF NEW YORK  
APPLICABLE TO THE AMERICAN SOCIETY OF  
CIVIL ENGINEERS.

ORIGINALLY INCORPORATED 1852.

INCORPORATED UNDER THESE LAWS, 1877.

REVISED STATUTES OF THE STATE OF NEW YORK. VIIIth EDITION, FEBRUARY 1ST, 1889. PART I. CHAPTER XVIII. TITLE 4C. ARTICLE 3D. L. 1884, CHAP. 319, AN ACT FOR THE INCORPORATION OF BENEVOLENT, CHARITABLE, SCIENTIFIC AND MISSIONARY SOCIETIES.

*Corporators ; Objects ; Certificate, contents of ; Change of Title of Managing Board, or increase or decrease of number of Members ; consent of Justice of Supreme Court. Section 1.*

Any five or more persons of full age, citizens of the United States, a majority of whom shall be citizens of, and resident within this State, who shall desire to associate themselves for benevolent, charitable, literary, historical, scientific, missionary or mission or Sunday-school purposes, or for the purpose of mutual improvement in religious knowledge, or for the furtherance of religious opinion, or for the purpose of promoting and cultivating the fine arts by establishing a gallery or collection of pictures and statuary, including other objects of the fine arts, and for the purpose of maintaining a library, or as a society for the prevention of crime, or for any two or more of such objects, may make, sign and acknowledge before any officer authorized to take the acknowledgment of deeds in the State, and file in the office of the Secretary of State, and also in the office of the Clerk of the County in which the business of such society is to be conducted, a certificate in writing, in which shall be stated the name or title by which such society shall be known in law, the particular business and objects of such society, the number of trustees, directors or managers to manage the same, and the names of the trustees, directors or managers of such society for the first year of its existence. And any corporation organized, or which may hereafter be organized under the provisions of this Act, may from time to time change the title of the members of their managing board, or increase or decrease the number thereof to not less than five, on the consent in writing of not less than two-thirds of their number. A certificate of such change, executed as herein above provided for the original certificate, shall be filed with the original certificate; but neither such original certificate nor such amendment thereof shall be filed unless by the written consent and approbation of one of the Justices of the Supreme Court of the district in which the place of business or principal office of such company or association shall be located, to be endorsed on such certificate.

[*Thus amended by L. 1883, ch. 446, superseding L. 1881, ch. 526.*]

*Corporation then formed ; powers ; property and income limited.* § 2.—Upon filing a certificate as aforesaid, the persons who shall have signed and acknowledged such certificate and their associates and successors, shall thereupon by virtue of this Act, be a body politic and corporate by the name stated in such certificate, and by that name they and their successors shall and may have

succession, and shall be persons in law capable of suing and being sued, and they and their successors may have and use a common seal, and the same may alter and change at pleasure ; and they and their successors, by their corporate name shall, in law, be capable of taking, receiving, purchasing and holding real and personal estate for the purposes of their incorporation, and for no other purpose, to an amount not exceeding in the aggregate the sum of two million dollars in value ; but the clear annual income of such real and personal estate shall not exceed the sum of two hundred thousand dollars ; to make by-laws for the management of its affairs, not inconsistent with the constitution and laws of this State or of the United States ; to elect and appoint the officers and agents of such society, for the management of its business, and to allow them a suitable compensation.

[ *Thus amended by L. 1885, ch. 88, superseding L. 1872, ch. 649.* ]

*Election of Trustees, etc.* § 3.—The society so incorporated may annually elect, from its members, its trustees, directors or managers, at such time and place, and in such manner, as may be specified in its by-laws, who shall have the control and management of the affairs and funds of said Society, a majority of whom shall be a quorum for the transaction of business, if not otherwise provided in the by laws, except that no such purchase, lease or sale of real estate shall be made unless two-thirds of the whole number are present at the meeting at which it is ordered ; and whenever any vacancy shall happen among such trustees, directors or managers, by death, resignation, or neglect to serve, such vacancy shall be filled in such manner as shall be provided by the by-laws of such society.

[ *Thus amended by L. 1853, ch. 487.* ]

*Provision in case no election is made.* § 4.—In case it shall at any time happen that an election of trustees, directors or managers shall not be made on the day designated by the by-laws, said society for that cause shall not be dissolved, but it shall and may be lawful on any other day to hold an election for trustees, directors or managers, in such manner as may be directed by the by-laws of such society.

*Restriction.* § 5.—The provisions of this Act shall not extend or apply to any association or individuals who shall, in the certificate filed with the Secretary of State, or with the County Clerk, use or specify a name or style the same as that of any previously existing incorporated society in this State.

[ *Thus amended by L. 1861, ch. 239.* ]

*Real or personal property may be held, etc.; proviso.* § 6.—Any corporation formed under this Act shall be capable of taking, holding or receiving any property, real or personal, by virtue of any devise or bequest contained in any last will or testament of any person whatsoever, the clear annual income of which devise or bequest shall not exceed the sum of ten thousand dollars ; provided, no person leaving a wife or child or parent, shall devise or bequeath to such institution or corporation more than one-fourth of his or her estate, after the payment of his or her debts, and such devise or bequest shall be valid to the extent of such one-fourth ; and no such devise or bequest shall be valid in any will which shall not have been made and executed at least two months before the death of the testator.

*Liability of Trustees.* § 7.—The trustees of any company or corporation organized under the provisions of this Act, present at any meeting authorizing the contracting of any debt, and acquiescing in the passage of any resolution or order authorizing the same, shall be jointly and severally liable for any such debt, provided a suit for the collection of the same shall be brought within one year after the debt shall become due and payable.

[*Thus amended by L. 1853, ch. 487.*]

*Institutions subject to Visitation by Justices of Supreme Court.* § 8.—All institutions formed under this Act, together with their books and vouchers shall be subject to the visitation and inspection of the Justices of the Supreme Court, or by any person or persons who shall be appointed by the Supreme Court for that purpose ; and it shall be the duty of the trustees, or a majority of them, in the month of December in each year, to make and file in the County Clerk's office where the original certificate is filed, a certificate under their hands, stating the names of the trustees and officers of such association or corporation, with an inventory of the property, effects and liability thereof, with an affidavit of the truth of such certificate and inventory, and also an affidavit that such association or corporation has not been engaged directly or indirectly in any other business than such as is set forth in the original certificate on file.

*General powers.* § 9.—Every corporation formed under this act shall possess the powers and be subject to the provisions and restrictions contained in the third title of the eighteenth chapter of the first part of the Revised Statutes.

[*Thus amended by L. 1849, ch. 273.*]

*Right to repeal.* § 10.—The Legislature may at any time amend, annul or repeal any incorporation formed or created under this Act.

*Increase of Trustees.* § 11.—The number of trustees, directors or managers in any corporation which may have been heretofore, or which may hereafter be organized under the said Act, may be increased as follows: The existing trustees of any such corporation, or a majority thereof, shall make and sign a certificate declaring how many trustees, directors or managers the corporation shall have in the future management of its business, and stating the names of the new or additional trustees, directors or managers, which certificate shall be acknowledged or be proved by a subscribing witness, and shall be filed in the office of the Secretary of State, and also in the office of the Clerk of the County where the original certificate of incorporation was filed ; and from and after the filing of such certificate, the trustees, directors or managers of such corporation shall be deemed increased to the number therein stated, and the persons so named shall be trustees until a new election of trustees, directors or managers shall be had according to said Act and the by-laws or regulations of said corporation.

[*Added by L. 1875, ch. 452.*]

*Extending corporate existence.* § 13.—The term of existence of any corporation which may have heretofore been, or which may hereafter be organized, under this Act, may be extended in the following manner: The trustees of such corporation, or a majority of them, shall make and sign a certificate de-



claring the term, not exceeding fifty years, for which the said corporation is to be continued, which certificate shall be duly acknowledged, and be filed in the office of the Secretary of State, and also a copy thereof in the office of the Clerk of the County where the original certificate of incorporation was filed; and from and after the filing of such certificate and copy, the said corporation shall be deemed continued for the term of years therein specified.

[*Added by L. 1876, ch. 190.*]

*Societies may re-incorporate themselves.* § 2.—The trustees, directors, or stockholders of any existing benevolent, charitable, scientific or missionary corporation may, by conforming to the requirements of the first section of the Act hereby amended, re-incorporate themselves or continue their existing corporate powers for the period limited by the Act hereby amended, and all the property and effects of such existing corporation shall vest in and belong to the corporation so re-incorporated or continued.

*By application to the Supreme Court.* SECTION 1.—It shall be lawful for the Supreme Court of this State, upon the application of any benevolent, charitable, scientific, or missionary society incorporated by law, in case it shall deem it proper, to make an order for the mortgaging of any real estate belonging to said corporation, and to direct the application of the moneys arising therefrom, by the said corporation, to such uses as the same corporation, with the consent and approbation of the said Court, shall conceive to be most for the interest of the society to which the real estate so mortgaged belongs.

*By application to the Supreme Court.* SECTION 1.—It shall be lawful for the Supreme Court of this State, upon the application of three-fourths of the trustees of any benevolent, charitable, scientific, missionary society or orphan asylum incorporated by law, in case it shall deem it proper, to make an order for the leasing or sale and conveyance of any real estate belonging to such corporation, and to direct the application of the moneys arising therefrom by the said corporation to such uses as to the said Court shall seem to be most for the interest of the corporation to which the real estate so leased or conveyed belongs.

*Act extended to educational institutions and parsonages.* SECTION 1. The “Act for the Incorporation of Benevolent, Charitable, Scientific, and Missionary Purposes,” passed April twelfth, eighteen hundred and forty-eight, shall be deemed to authorize the incorporation of any society for the purpose of establishing and maintaining any educational institution or chapel, or place of Christian worship, or any parsonage, rectory, or official residence of any bishop, pastor or minister of any Christian church or association.

*Classification of trustees.* § 2.—It shall be lawful for the trustees or managers of any society incorporated under the Act aforesaid, or under this Act, to provide in their by-laws for the classification and the mode of perpetuating the board of trustees or managers, and filling vacancies therein, as the same may occur.

*Existing societies.* § 5.—This Act shall apply as well to societies heretofore organized under the aforesaid Act, as to those which shall be hereafter organized.

## PROVISIONS OF TITLE III. APPLICABLE TO THE SOCIETY.

---

SECTION 1. Every corporation, as such, has power,—

1. To have succession by its corporate name, for the period limited in its charter ; and when no period is limited, perpetually :

2. To sue and be sued, complain and defend, in any court of law or equity:

3. To make and use a common seal, and alter the same at pleasure:

4. To hold, purchase and convey such real and personal estate as the purposes of the corporation shall require, not exceeding the amount limited in its charter:

5. To appoint such subordinate officers and agents as the business of the corporation shall require, and to allow them a suitable compensation :

6. To make by-laws, not inconsistent with any existing law, for the management of its property, the regulation of its affairs, and for the transfer of its stock.

§ 2. The powers enumerated in the preceding section shall vest in every corporation that shall hereafter be created, although they may not be specified in its charter or in the act under which it shall be incorporated.

§ 3. In addition to the powers enumerated in the first section of this title, and to those expressly given in its charter, or in the act under which it is or shall be incorporated, no corporation shall possess or exercise any corporate powers, except such as shall be necessary to the exercise of the powers so enumerated and given.

§ 9. Upon the dissolution of any corporation created, or to be created, and unless other persons shall be appointed by the Legislature, or by some Court of competent authority, the directors or managers of the affairs of such corporation, at the time of its dissolution, by whatever name they may be known in law, shall be the trustees of the creditors and stockholders of the corporation dissolved, and shall have full power to settle the affairs of the corporation, collect and pay the outstanding debts, and divide among the stockholders the moneys and other property that shall remain, after the payment of debts and necessary expenses.

§ 10. The persons so constituted trustees shall have authority to sue for and recover the debts and property of the dissolved corporation by the name of the trustees of such corporation, describing it by its corporate name, and shall be jointly and severally responsible to the creditors and stockholders of such corporation to the extent of its property and effects that shall come into their hands.

# List of Members.

AUGUST, 1891.

---

It is particularly requested that every change of address be immediately communicated to

THE SECRETARY,

AMERICAN SOCIETY OF CIVIL ENGINEERS,

127 EAST TWENTY-THIRD STREET,

NEW YORK, N. Y.

# American Society of Civil Engineers.

---

## OFFICERS, 1891.

O. CHANUTE, *President.*  
ALPHONSE FTELEY, CHARLES HERMANY, *Vice-Presidents.*  
F. COLLINGWOOD, *Secretary and Librarian.*  
JOHN BOGART, *Treasurer.*

---

## DIRECTORS.

CHARLES B. BRUSH, CLEMENS HERSCHEL,  
RUDOLPH HERING, EDWARD P. NORTH,  
SAMUEL WHINERY.

---

## PRESIDENTS OF THE SOCIETY.

JAMES LAURIE,* November 5, 1852, to November 6, 1867.	JAMES B. FRANCIS, November 3, 1880, to January 18, 1882.
JAMES P. KIRKWOOD,* November 6, 1867, to August 5, 1868.	ASHBEL WELCH,† January 18, 1882, to September 25, 1882.
WILLIAM J. MCALPINE,* August 5, 1868, to November 3, 1869.	CHARLES PAINE, January 17, 1883, to January 16, 1884.
ALFRED W. CRAVEN,* November 3, 1869, to November 1, 1871.	DON J. WHITEMORE, January 16, 1884, to January 21, 1885.
HORATIO ALLEN,* November 1, 1871, to November 5, 1873.	FREDERIC GRAFF,* January 21, 1885, to January 20, 1886.
JULIUS W. ADAMS, November 5, 1873, to November 3, 1875.	HENRY FLAD, January 20, 1886, to January 19, 1887.
GEORGE S. GREENE, November 3, 1875, to November 7, 1877.	WILLIAM E. WORTHEN, January 19, 1887, to January 18, 1888.
E. S. CHESBROUGH,* November 7, 1877, to November 6, 1878.	THOMAS C. KEEFER, January 18, 1888, to January 16, 1889.
W. MILNOR ROBERTS,* November 6, 1878, to November 5, 1879.	MAX J. BECKER, January 16, 1889, to January 15, 1890.
ALBERT FINK, November 5, 1879, to November 3, 1880.	WILLIAM P. SHINN, January 15, 1890, to January 21, 1891.
	O. CHANUTE, January 21, 1891.

---

\* Deceased.

† Mr. Ashbel Welch died September 25, 1882, during his term of office as President.

# List of Members.

## HONORARY MEMBERS.

[Hon. M. Am. Soc. C. E.]

Name.	Address.	Date of Membership.
ADAMS, JULIUS W.*	( <i>Past-President</i> ) 155 Congress st., Brooklyn, N. Y.	Oct. 26, 1888
DUANE, JAMES C.	Brig.-Gen. U. S. A., 280 Broadway, New York City.	Nov. 20, 1886
GREENE, GEORGE S.*	( <i>Past-President.</i> ) Major General, Morristown, N. J.	Oct. 26, 1888
NEWTON, JOHN	Brig. and Bvt. Maj.-Gen. Ch. of Engrs., U. S. A. (Retired), Panama R. R. office, 29 Broadway, New York City.	April 30, 1884
ROBINSON, MONCURE	1319 Spruce st., Philadelphia, Pa.	July 6, 1853
WRIGHT, HORATIO G.	Brig. and Bvt. Maj.-Gen., U. S. A., (Retired), 1203 N st., N. W., Washington, D.C.	March 3, 1880

## CORRESPONDING MEMBERS.

Name.	Address.	Date of Membership.
FOX, SIR DOUGLAS	28 Victoria st., Westminster, London, England.	June 7, 1871
GLEIM, CHARLES OTTO	Div. Eng. Bau-Deputation, 17 Bleichenbrücke, Hamburg, Germany.	April 5, 1876
PONTZEN, ERNEST	Civil and Cons. Eng., 3 Avenue du Coq, Paris, France.	Jan. 5, 1876

\* Elected Member November 5, 1852.



# MEMBERS.

[M. Am. Soc. C. E.]

Name.	Address.	Date of Membership.
ABBOT, FREDERIC V.	Capt. Corps of Engs., U. S. A., U. S. Eng. Office, 3 Southern Wharf, Charleston, S. C.	Dec. 3, 1884
ABBOTT, JOB	Vice-Pres. and Ch. Eng. Wheeling Bridge & Terminal Ry., 150 Broadway, Room 31, New York City.	April 1, 1891
ABERT, S. THAYER	U. S. Agent and Civ. Eng., 1928½ Penna. Ave., Washington, D. C.	Sept. 21, 1870
AERTSEN, GUILLIAEM	Man. Latrobe Steel Works, La- trobe, Pa.	Oct. 1, 1890
AIKEN, WILLIAM A.	Res. Eng. Pittsburgh Test. Lab- oratory, 765 The Rookery, Chi- cago, Ill.	Oct. 2, 1889
AINSWORTH, DANFORTH H.	Newton, Iowa.	Mar. 3, 1886
ALDEN, JOHN F.	Rochester Bridge and Iron Works, Rochester, N. Y.	July 6, 1887
ALDRICH, JAMES C.	Chopmist P. O., Providence Co., R. I.	May 7, 1873
ALDRICH, TRUMAN H.	92 Southern ave., Mt. Auburn, Cincinnati, Ohio.	May 4, 1881
ALLEN, CHARLES A.	City Eng., Worcester, Mass.	June 4, 1879
ALLEN, C. FRANK	Assoc. Prof. R. R. Engineering, Mass. Inst. Tech., Boston, Mass.	Feb. 6, 1878
ALLEN, CALVIN H.	Pres. Western New York & Penn- sylvania R. R., Mills Building, 15 Broad St., New York City.	Sept. 7, 1887
ALLEN, JAMES P.	126 Wentworth St., Charles- ton, S. C.	J. Mar. 5, 1879 M. June 4, 1884
ALLEN, KENNETH	Eng. in chg. Topog. Survey H. C. Frick Coke Co., Scottdale, Pa.	May 2, 1888
ALLEN, WILLIAM A.	Ch. Eng. M. C. R. R., Portland, Me.	May 6, 1891
AMBROSE, WILLIAM C.	Res. Eng. Main. Way, Southern Pacific Co., Tulare, Cal.	April 4, 1888
AMWEG, FREDERICK J.	Civil Eng. and Archt., Keystone Bank Bldg., Philadelphia, Pa.	Mar. 7, 1888
ANDERSON, LATHAM	Eng. and Supt. of Parks, John- ston Bldg., Room 49, Cincinnati, Ohio.	May 2, 1888

## MEMBERS.

33

Name.	Address.	Date of Membership.	
ANDREWS, DAVID H.	Proprietor of Boston Bridge Works, 70 Kilby St., Boston, Mass.	Sept.	2, 1885
ANDREWS, HORACE	City Eng., Albany, N. Y.	April	6, 1887
ANDREWS, JOHN W.	Ch. Eng. Columbus, Fort Wayne & Western Ry., Covington, Ky.	Mar.	1, 1882
ANNAN, CHARLES L.	Asst. City Eng., St. Paul, Minn.	July	4, 1888
APPLETON, ELLERY C.	Asst. Eng. Boston Water Works, Revere, Mass.	June	3, 1885
APPLETON, THOMAS	Civil Eng. and Archt., 505 Rialto Bldg., Chicago, Ill.	April	4, 1883
ARCHBALD, JAMES	Cons. Eng. Delaware, Lackawanna & Western R. R., Scranton, Pa.	May	15, 1872
ARCHER, WILLIAM	Asst. Eng. Baltimore & Ohio South-western R. R., Cincinnati, Ohio.	Mar.	2, 1881
ARCHIBALD, PETER S.	Ch. Eng. Intercolonial Ry., Moncton, N. B., Canada.	Jan.	7, 1885
ARMINGTON, JAMES H.	Cons. Eng. Brooklyn Gas Light Co., Riverside, R. I.	July	6, 1870
ARTINGSTALL, SAMUEL G.	Civil Eng., 28 Rialto Bldg., Chicago, Ill.	Oct.	6, 1886
ASHMEAD, FRANK M.	Res. Eng. Allegheny Valley R. R., 11th and Pike sts., Pittsburgh, Pa.	July	6, 1887
ASPINWALL, THOMAS	12 Pearl St., Boston, Mass.	May	2, 1888
ASSEERSON, PETER C.	Civil Eng., U. S. N., U. S. Navy Yard, Brooklyn, N. Y.	July	5, 1882
ATKINSON, JOHN B.	Vice-Pres. and Treas. St. Bernard Coal Co., Earlington, Ky.	Sept.	5, 1877
ATWATER, A. B.	Supt. Chicago & Grand Trunk and Detroit, Grand Haven & Milwaukee Rys., Detroit, Mich.	May	5, 1886
AUCHINCLOSS, WILLIAM S.	209 Church St., Philadelphia, Pa.	Feb.	17, 1869
AULLS, HERBERT L.	Pioneer Bldg., Room 33, Denver, Colo.	July	1, 1885
AXTELL, DECATUR	Asst. to Pres. Columbus & Ohio Ry., Richmond, Va.	March	3, 1886
AYRES, HENRY W.	Res. Eng. City Water Works, Hartford, Conn.	March	5, 1890
BABCOCK, HENRY N.	U. S. Asst. Engineer, Army Bldg., 39 Whitehall St., New York City.	Sept.	3, 1884
BACON, JOHN W.	State Commissioner Connecticut Topographical Survey, Danbury, Conn.	July	12, 1877
BACOT, WILLIAM SINCLAIR	Eng. of County Roads, Richmond Co., N. Y., 145 Broadway, New York City.	Oct.	1, 1890

Name.	Address.	Date of Membership.	
BAILLEY, GEORGE I.	Eng. in charge, Mohawk, N. Y.	Oct.	1, 1890
BAKER, HOLLAND W.	Civil Eng., 441 D st., St. Louis, Mo.	May	7, 1890
BAKER, WILLIAM H.	Fitchburg, Mass.	Sept.	6, 1882
BALDWIN, FRED. H.	(Drew, Baldwin & Co.), Mill Engs. and Archts., 45 Broadway, New York City.	Nov.	5, 1884
BALDWIN, THOMAS W.	Exchange Block, Room 1, Bangor, Me.	April	2, 1884
BALDWIN, WARD	Prof. of Civil Eng., University of Cincinnati, Cincinnati, Ohio.	J. March	2, 1882
		M. Oct.	2, 1889
BALDWIN, WM. HENRY	Manor Hall, Yonkers, N. Y.	June	6, 1888
BALDWIN, WILLIAM J.	Mech. Eng. Warming and Ventilating Buildings, etc., 277 Pearl st., New York City.	Sept.	5, 1888
BALL, CHARLES B.	Asst. Eng. District Govt. (Residence, 942 T st., N. W.), Washington, D. C.	Oct.	1, 1890
BALLARD, ROBERT	Rockhampton, Queensland, Australia.	Sept.	1, 1880
BALSTON, OSCAR F.	Ch. Eng. Kings Co. & Fulton Elevated Rys., 346 Fulton st., Brooklyn, N. Y.	Feb.	5, 1890
BARLOW, JOHN Q.	Div. Eng. Union Pacific Ry., Milford, Utah.	J. April	7, 1886
		M. July	4, 1888
BARNARD, AUGUSTUS P.	125 E. 26th st., New York City.	April	5, 1876
BARNARD, JOHN F.	Pres. and Gen. Man. Ohio & Mississippi Ry., Cincinnati, Ohio.	Sept.	1, 1881
BARNES, DAVID L.	Cons. Eng., 706 The Rookery, Chicago, Ill.	July	2, 1890
BARNES, OLIVER W.	Ch. Eng. New York & Long Island R. R., 57 Broadway, New York City.	July	6, 1881
BARR, JACOB N.	Supt. Motive Power, Chicago, Milwaukee and St. Paul Ry., Milwaukee, Wis.	Nov.	7, 1888
BARTLETT, WINTHROP	Ch. Eng. St. Louis & Suburban Ry., Cons. Eng. Mo. R. R. and Dallas Cable Ry., 56 Turner Bldg., St. Louis, Mo.	Jan.	2, 1889
BASSEL, ROBERT	Royal Inspector of Ry. Construction and Traffic, Frankfurt, Germany.	May	2, 1888
BASSETT, CARROLL PH.	Cor. Broadway and Market sts., Newark, N. J.	Nov.	7, 1888
BATES, CHARLES J.	Civil and Mech. Eng., 63 Broadway, New York City, and 47 Honore Bldg., Chicago, Ill.	May	1, 1889

## MEMBERS.

35

Name.	Address.	Date of Membership.	
BATES, ONWARD	Eng. and Supt. Bridges and Bldgs. C. M. & St. P. Ry., 617 Rand-McNally Bldg., Chicago, Ill.	Jan.	4, 1882
BAXTER, GEORGE S.	Treas. Northern Pacific R. R., 17 Broad st., New York City.	J. May	12, 1875
		M. May	3, 1876
BAYLISS, RAWLINSON T.	Res. Man'g. Director, The Montana Co. (Lt.), Marysville, Montana.	June	4, 1890
BEAHAN, WILLARD	Watkins, N. Y.	April	3, 1889
BECKER, MAX J.	(Past-President.) Ch. Eng. Pittsburgh, Cincinnati and St. Louis R. R., Pittsburgh, Pa.	Aug.	7, 1872
BECKWITH, LEONARD F.	Ch. Eng. Consolidated Telegraph & Electrical Subway Co., 113 W. 38th st., New York City.	Dec.	16, 1868
BELL, ANDREW	Cons. Eng., Almonte, Ontario, Canada.	Sept.	5, 1883
BELL, HENRY P.	Valdivia, Chili, S. A.	June	4, 1884
BEMENT, ROBERT B. C.	Cor. 4th and Waconta sts., St. Paul, Minn.	Sept.	7, 1887
BENSEL, JOHN A.	Asst. Eng. Dept. Docks, 64 East 79th st., New York City.	J. Sept.	2, 1885
		M. Mar.	4, 1891
BENSON, FRED S.	Eng. Nassau Gas Light Co., cor. Kent ave. and Cross st., Brooklyn, N. Y.	Feb.	7, 1877
BENT, C. C. F.	Supt. Ohio & Mississippi Ry., Cincinnati, Ohio.	May	1, 1889
BENYAURD, WILLIAM H. H.	Lieut.-Col. Corps. Engs. U. S. A., San Francisco, Cal.	Nov.	3, 1875
BENZENBERG, GEORGE H.	City Eng., Milwaukee, Wis.	May	2, 1883
BERGEN, VAN BRUNT	Prin. Asst. Eng., Dept. of City Works, Brooklyn, N. Y.	June	17, 1868
BERRIAN, RICHARD M.	Morton House, Niantic, Conn.	May	4, 1887
BIDDLE, WILLIAM F.	209 S. Third st., Philadelphia, Pa.	June	4, 1884
BIGELOW, EDWARD M.	Ch. Eng. Dept. Pub. Works, Pittsburgh, Pa.	Dec.	4, 1889
BILLIN, CHARLES E.	Supt. Bridge & Cons. Dept., Penna. Steel Co., Steelton, Pa.	J. April	5, 1876
		M. July	3, 1878
BISHOP, GEORGE H.	Eng. Water Works, Middletown, Conn.	Aug.	7, 1872
BISHOP, THOMAS S.	Eng. Russell & Erwin Mfg. Co., New Britain, Conn.	Sept.	2, 1885
BISSELL, H.	Ch. Eng. Boston and Maine R. R., Boston, Mass.	Sept.	15, 1869

Name.	Address.	Date of Membership.
BIXBY, WILLIAM H.	Capt. Corps of Engs., U. S. A., Wilmington, N. C.	April 5, 1882
BLACK, WM. MURRAY	Capt. Corps of Engs., U. S. A., St. Augustine, Fla.	June 6, 1888
BLACKFORD, FRANCIS W.	Civil Eng. and U. S. Dep. Min. Surveyor, Lewisohn Bldg., Butte, Mont.	April 4, 1888
BLACKWELL, CHARLES	Heron ave., Pittsburgh, Pa.	Sept. 7, 1881
BLAISDELL, ANTHONY H.	5602 South Broadway, St. Louis, Mo.	March 3, 1880
BLAKE, EDWARD J.	Ch. Eng. Chicago, Burlington & Quincy R. R., Chicago, Ill.	April 3, 1889
BLAND, GEORGE P.	3214 Woodland avenue, West } Philadelphia, Pa. {	J. April 7, 1875 M. May 4, 1881
BLAND, J. C.	Cons. Eng., 41 Hagerman Bldg., Colorado Springs, } Colo. {	J. June 1, 1875 M. June 4, 1879
BLICKENSDERFER, JACOB	Cons. Eng., Oakland, Laclede Co., Mo.	June 1, 1881
BLICKENSDERFER, ROBERT	Oakland, Laclede Co., Mo.	June 1, 1881
BLISS, HENRY I.	Civil Eng., La Crosse, Wis.	Sept. 5, 1883
BODFISH, SUMNER H.	Washington, D. C.	Oct. 2, 1889
BOEKE, AUGUSTUS W.	City Eng. and Eng. Bridges, Wyandotte Co., Argentine, Kans.	Sept. 3, 1890
BOGART, JOHN	( <i>Treasurer.</i> ) 71 Broadway, New York City.	Feb. 17, 1869
BOGUE, VIRGIL G.	(Care Am. Soc. C. E.) 127 E. 23d st., New York City.	Sept. 15, 1869
BOLLER, ALFRED P.	Cons. Eng., 71 Broadway, New York City.	Dec. 4, 1867
BOLTON, CHANNING M.	Ch. Eng. Richmond & Danville R. R., Atlanta, Ga.	Jan. 4, 1888
BOND, GEORGE M.	Man. Standards and Gauge Dept., The Pratt & Whitney Co. (Resi- dence, 141 Washington st.), Hartford, Conn.	Feb. 2, 1887
BONNETT, WILLIAM W.	Civil Eng., Waterbury, Conn.	Sept. 4, 1872
BONTECOU, DANIEL	Ch. Eng. Kansas City, Fort Scott & Memphis R. R., Kansas City, Mo.	Nov. 5, 1879
BONZANO, ADOLPHUS	Vice-Pres. and Ch. Eng. The Phoenix Bridge Co., Phoenixville, Pa.	Aug. 7, 1872
BONZANO, MAXIMILIAN F.	Asst. Gen. Supt. Philadelphia & Reading R. R., 227 S. Fourth st., Philadelphia, Pa.	Jan. 6, 1886



Name.	Address.	Date of Membership.	
BOOKER, B. F.	Asst. Eng. A. T. & S. F. R.R., Topeka, Kans.	{ J. Oct. 7, 1885 M. June 3, 1891	
BOOTH, WILLIAM H.	(Man. Eng. Le Grand & Sutcliff, 100 Bernhill Row), 29 St. Mary's road, Willesden, London, N. W., England.	July 4, 1888	
BOTT, JNO. B.	Prin. Asst. Eng. Baltimore Belt R. R., 2216 Oak st., Baltimore, Md.	Oct. 1, 1890	
BOUSCAREN, LOUIS F. G.	Cons. Eng., Mitchell Bldg., Cin- cinnati, Ohio.	April 7, 1875	
BOWIE, AUGUSTUS J.	Cons. Eng., 217 Sansome st. (P. O. Box 2471), San Francisco, Cal.	Nov. 1, 1882	
BOYD, CHARLES R.	Wytheville, Wythe Co., Va.	April 6, 1881	
BOYNTON, GEORGE H.	Asst. Eng. Chicago, Rock Island & Pacific Ry., Davenport, Iowa.	Sept. 3, 1884	
BRACKENRIDGE, WILLIAM A.	Div. Eng. Niagara Falls Power Co., Niagara Falls, N. Y.	June 2, 1886	
BRACKETT, DEXTER	Asst. Eng. City Engineer's Office, City Hall, Boston, Mass.	June 6, 1888	
BRADLEY, TIMOTHY C.	Pres. Cookson Iron Works, cor. 8th and Mulberry sts., Kansas City, Mo.	Dec. 6, 1882	
BRADLEY, WILLIAM H.	85 Water st., Boston, Mass.	Feb. 5, 1879	
BRAINARD, HENRY A.	(Care <i>The Santa Clara Valley</i> ), San Jose, Santa Clara Co., Cal.	Feb. 6, 1884	
BRECKENRIDGE, CABELL	Erlanger, Ky.	June 1, 1881	
BREEN, HOWARD	142 East 5th st., Cincinnati, Ohio.	April 4, 1888	
BREITHAAPT, WILLIAM H.	Civ. Eng., 18 Broadway, New { J. York City. { M.	June 4, 1884 July 6, 1887	
BRENDLINGER, PETER F.	79 Warburton ave., Yonkers, N. Y.	Sept. 7, 1887	
BRIGGS, JOSIAH A.	Fordham, New York City.	Sept. 1, 1886	
BRIGGS, ROSWELL E.	1439 William st., Denver, Colo.	Sept. 15, 1869	
BRINCKERHOFF, ALEX. G.	Supt. works, Johnson & Morris, 114 Leonard st., New York City.	Nov. 3, 1886	
BRINCKERHOFF, H. WALLER	Asst. Eng. Broadway Cable Road, 113 West 38th st., New York City,	Nov. 7, 1883	
BRINSMADE, DANIEL S.	Eng. Ousatonic Water Co., Bir- mingham, Conn.	Feb. 1, 1888	
BRITTAIN, ALFRED	Asst. City Surveyor, City Hall, Montreal, Canada.	Nov. 2, 1881	
BRODHEAD, CALVIN E.	Caledonia, Livingston Co., N. Y.	Feb. 21, 1872	
BROOKS, FRED.	31 Milk st., Boston, Mass. { J. M.	June 7, 1876 Jan. 2, 1884	
BROWN, ALBA F.	Gen. Man. Keystone Bridge Co., Pittsburgh, Pa.	Sept. 7, 1887	
BROWN, CHARLES I.	Eng. St. Louis & San Francisco Ry., 7th and Cerre sts., St. Louis, Mo.	Jan. 7, 1891	

Name.	Address.	Date of Membership.		
BROWN, CHARLES O.	Pres. The Riverside Bridge and Iron Works, 18 Broadway, New York City.	{ J.	Jan.	6, 1875
		{ M.	Nov.	7, 1877
BROWN, E. L.	Civil Eng. and Eng. East Side Electric St. Ry., Brockton, Mass.		Sept.	5, 1888
BROWN, THOMAS E., Jr.,	Ch. Eng. Otis Bros. & Co., 38 Park Row, New York City.	{ J.	Nov.	3, 1880
		{ M.	April	2, 1884
BROWNE, GEORGE H.	Gen. Man. Phila. Co., 820 Penn. ave., Pittsburgh, Pa.		Sept.	3, 1884
BRUEN, FRANK	Civil Eng. New Haven, Conn.		June	1, 1886
BRUNER, DANIEL P.	Civil Eng., Germantown, Philadelphia, Pa.	{ J.	Sept.	6, 1876
		{ M.	May	7, 1879
BRUSH, CHARLES B.	(Director.) 1 Newark st., Hoboken, N. J.	{ A.	Sept.	6, 1871
		{ M.	Sept.	5, 1877
BRYSON, ANDREW	12 Broadway, Room 44, New York City.		April	1, 1885
BUCHANAN, E. E.	Elmira Bridge Co., Elmira, N. Y.		Dec.	4, 1889
BUCHHOLZ, CARL W.	Civil Eng. New York, Lake Erie & Western R. R., 21 Cortlandt st., New York City.		Sept.	1, 1886
BUCK, LEFFERT L.	Civil Eng., 18 Broadway, New York City.		Feb.	3, 1875
BUCK, WALDO E.	Special Insp. Assoc. Factory Mutual Ins. Co., 544 Main st., Woburn, Mass.		July	3, 1889
BUDDE, OTTO C. E.	Essen, Prussia.		July	4, 1888
BUDGE, ENRIQUE	Valparaiso, Chili.		Feb.	1, 1882
BULLOCK, WILLIAM D.	Asst. Eng. in chg. Bridges and Harbor, City Hall, Providence, R. I.	{ J.	Sept.	5, 1877
		{ M.	July	4, 1888
BURBANK, GEORGE B.	Res. Constr. Eng. Cataract Constr. Co., Niagara Falls, N. Y.		July	4, 1888
BURDEN, JAMES A.	Pres. The Burden Iron Co., Troy, N. Y.		July	2, 1879
BURGWIN, COLLINSON P. E.	905½ E. Main st., Richmond, Va.		Nov.	1, 1882
BURNET, GEORGE	Street Commr., City Hall, St. Louis, Mo.		Mar.	1, 1882
BURNS, EDWARD C.	Cor. East 4th and Spring sts., Jamestown, N. Y.		July	5, 1882
BURPEE, MOSES	Ch. Eng. New Brunswick Ry., Woodstock, New Brunswick, Canada.		Sept.	3, 1884
BURR, EDWARD	First Lieut. Corps of Engs., U. S. A., Cascade Locks, Ore.		May	6, 1891
BURR, WILLIAM H.	Vice-Pres. Sooy Smith & Co., 2 Nassau st., New York City.	{ J.	June	4, 1874
		{ A.	May	5, 1880
		{ M.	Mar.	3, 1886

Name.	Address.	Date of Membership.	
BURROWES, FRANCIS S.	U. S. Asst. Eng., U. S. Engineer office, Portland, Me.	June	6, 1888
BUSH, H. D.	Pres. The Vogel Cable Cons. Co., 15 Broad st., New York City.	May	2, 1888
BUTLER, M. J.	Ch. Eng. K. N. & W. Ry., Napanee, Ontario, Canada.	April	1, 1885
BUTTERFIELD, FRANCIS E.	Hotel Hidalgo, Monterey, Mexico.	Sept.	1, 1886
BUXTON, CLIFFORD	Ch. Eng. Toledo & Ohio Central; Toledo, Columbus & Cincinnati; Kanawha & Michigan Rys., Toledo, Ohio.	May	6, 1885
BYLLESBY, HENRY M.	Prest. North West. Thomson-Houston Elec. Co., 403 Sibley st., St. Paul, Minn.	June	1, 1887
CAIN, WILLIAM	Prof. Mathematics and Engineering, University of North Carolina, Chapel Hill, N. C.	Nov.	7, 1888
CALKINS, FRANK A.	Eng. Idaho Falls Canal & Irrigation Co., Idaho Falls, Idaho.	April	5, 1882
CAMP, FRED A.	1709 Thomas pl., Minneapolis, Minn.	Sept.	3, 1884
CAMPBELL, ALLAN	125 Lexington ave., New York City.	Feb.	19, 1868
CAMPBELL, CHARLES E. H.	Bridge Eng., Council Bluffs, Iowa.	Oct.	3, 1883
CANFIELD, EDWARD	Ch. Eng. New York, Ont. & Western Ry., Middletown, N. Y.	Dec.	3, 1879
CARD, WILLIAM W.	Secretary, The Westinghouse Air Brake Co., Pittsburgh, Pa.	Sept.	5, 1883
CARPENTER, CLARENCE, A.	Eng. L. S. Div. Lake Shore & Mich. Southern Ry., Cleveland, Ohio.	May	2, 1888
CARREL, FREDERICK J.	Cons. Eng., Spokane, Wash.	Mar.	5, 1884
CARTER, EDWARD C.	Prin. Asst. Eng. Chicago & North-Western Ry., Chicago, Ill.	April	4, 1888
CARTER, HENRY H.	Supt. of Streets, City Hall, Boston, Mass.	May	7, 1890
CARTER, OBERLIN M.	Capt. Corps Engrs., U. S. A., P. O. Drawer R., Savannah, Ga.	Mar.	7, 1888
CARTWRIGHT, ROBERT	Civil and Mech. Eng., 1 Hawthorne st., Rochester, N. Y.	July	10, 1872
CHANUTE, OCTAVE	(President.) Cons. Eng., 5 Ritchie pl., Chicago, Ill.	Feb.	19, 1868
CHAPMAN, WILLIS D.	Akron, Ohio.	May	7, 1884
CHASE, JOSIAH G.	Cambridgeport, Mass.	June	1, 1870
CHENEY, JOHN E.	Asst. City Eng., City Hall, Boston, Mass.	May	7, 1884

Name.	Address.	Date of Membership.	
CHILDS, JAMES E.	Gen. Man. N. Y., Ont. & W. R. R., 16 Exchange pl., New York City.	Dec.	4, 1878
CHIPMAN, WILLIS	City Engineer, Brockville, Ontario, Canada.	June	6, 1888
CHITTENDEN, SAMUEL H.	East River, Conn.	April	5, 1876
CHRISTIE, JAMES	Eng. Pencoyd Iron Works, Pen- coyd, Pa.	May	7, 1873
CHURCH, BENJAMIN S.	Cons. Eng. 54 West 12th st., New York City.	Dec.	4, 1867
CHURCH, CHARLES T.	Geneva, N. Y.	May	1, 1889
CHURCH, GEORGE EARL	Dashwood House, 9 New Broad st., E. C., London, England.	Nov.	2, 1887
CHURCHILL, CHARLES S.	Eng. Main. Way, Norfolk & West- ern R. R., Roanoke, Va.	May	1, 1889
CISNEROS, FRANCIS J.	Mang. Director Barranquilla Ry. & Pier Co., Barranquilla, U. S. Colombia.	May	15, 1872
CLAPP, LORENZO RUSSELL	Asst. Eng. Dept. City Works, 29 Municipal Bldg., Brooklyn, N. Y.	Feb.	1, 1888
CLARK, GEO. HUNTINGTON	Ch. Eng. East & West R. R. of Ala., Cedartown, Ga.	Mar.	5, 1890
CLARK, JACOB M.	119 Liberty st., New York City, (Residence, 145 Madison ave., Elizabeth, N. J.)	Jan.	29, 1868
CLARKE, DAVID D.	South Bend, Wash.	July	5, 1882
CLARKE, ELIOT C.	15 Brimmer st., Boston, Mass.	Sept.	4, 1878
CLARKE, H. WADSWORTH	Cons. Eng. (Clarke, Marcher & Allen, Civil Engs.), 424-5 Kirk Block, Syracuse, N. Y.	Mar.	15, 1871
CLARKE, THOMAS C.	1 Broadway, New York City.	Mar.	18, 1868
CLEEMAN, THOMAS M.	2135 Spruce st., Philadelphia, Pa.	Oct.	1, 1879
CLEMENT, FRANK H.	Niagara Falls, N. Y.	Nov.	1, 1882
COBB, ROBERT L.	Eng. Louisville & Nashville R. R., Clarksville, Tenn.	Jan.	2, 1890
CODWISE, EDWARD B.	City Eng., Kingston, N. Y., and Ch. Eng. Ulster & Delaware R. R., Kingston, N. Y.	Sept.	5, 1888
COE, WILLIAM W.	Ch. Eng. Norfolk & Western R. R., Roanoke, Va.	April	3, 1889
COFFIN, AMORY	Ch. Eng. Phoenix Iron Co., Phœ- nixville, Pa.	Mar.	3, 1875
COFFIN, WILLIAM B.	Supt. J. T. & K. W. Ry., Jackson- ville, Fla.	Nov.	6, 1872
COGSWELL, WILLIAM B.	Gen. Man. Solvay Process Co., { A. Feb. 15, 1871 25 White Bldg., Syracuse, { M. Oct. 16, 1872 N. Y.		
COHEN, MENDES	825 N. Charles st., Baltimore, Md.	Dec.	4, 1867

Name.	Address.	Date of Membership.	
COLLINGWOOD, FRANCIS	(Secretary.) 127 East 23d st., New York City. (Residence, Elizabeth, N. J.)	Mar.	10, 1869
COLTON, OREN B.	2009 Wallace st., Philadelphia, Pa.	April	2, 1884
COMSTOCK, CYRUS B.	Col. Corps of Engs., Bvt. Brig.-Gen. U. S. A., Army Bldg., 39 Whitehall st., New York City.	Sept.	1, 1880
CONNETT, ALBERT N.	Ch. Eng. City Passenger Ry., } Baltimore, Md. }	J. June 6, 1883 M. Oct. 1, 1890	
CONSTABLE, CASIMIR	Constableville, N. Y.	June	17, 1868
COOLEY, GEORGE W.	642 Boston Block, Minneapolis, Minn.	Sept.	2, 1885
COOLMAN, DEWITT C.	Ravenna, Ohio.	Mar.	4, 1874
COOPER, SAMUEL L.	Asst. Eng. N. Y. Finance Dept., Shonnard Terrace, Yonkers, N. Y.	Feb.	6, 1889
COOPER, THEODORE	Cons. Eng., 35 Broadway, New York City.	Mar.	4, 1874
COPPÉE, H. ST. L.	Civil Eng., Vicksburg, Miss.	Oct.	5, 1887
CORNELL, GEORGE B.	Ch. Eng. J. B. & J. M. Cornell } Iron Works, 143 Centre st., } New York City. }	J. Aug. 6, 1879 M. Oct. 6, 1886	
CORNELL, OLIVER H. P.	Ch. Eng. Cincinnati, Alabama & Atlantic R. R., Tullahoma, Tenn.	April	4, 1883
CORTHELL, ELMER L.	205 La Salle st., Chicago, Ill.	Sept.	2, 1874
COTTON, JOSEPH P.	Civil and Sanitary Eng., Newport, R. I.	June	7, 1876
COURTENAY, WILLIAM H.	Prin. Asst. Eng. Louisville & Nashville R. R., Louisville, Ky.	July	3, 1889
COVODE, JAMES H.	41 Sheldon st., Grand Rapids, Mich.	April	2, 1890
COWLES, WALTER L.	Ch. Eng. The Youngstown Bridge Co., Youngstown, Ohio.	Mar.	6, 1889
COX, A. BEEKMAN	Cherry Valley, N. Y.	May	7, 1873
COXE, ECKLEY B.	Drifton, Luzerne Co., Pa.	Feb.	7, 1877
CRAIG, CHAMBERS M.	Ch. Eng. M. T. & M. R. R., Ala. Midland R. R., Montgomery, Ala.	Nov.	3, 1886
CRAIGHILL, WILLIAM P.	Col. Corps of Eng. U. S. A., 9 Pleasant st., Baltimore, Md.	Oct.	7, 1885
CRAVEN, ALFRED	Div. Eng. New Croton Aqueduct, Carmel, N. Y.	Dec.	5, 1888
CRAWFORD, WILLIAM	Asst. Res. Eng. Sault Ste. Marie Canal, Sault Ste. Marie, Ontario, Canada.	Nov.	7, 1888
CROES, J. JAMES R.	Cons. Eng., 13 William st., New York City.	Dec.	4, 1867



Name.	Address.	Date of Membership.
CROSBY, BENJAMIN L.	Res. Eng. St. Louis Extension, St. Louis, Keokuk & North- western R. R., Room 58 Turner Bldg., St. Louis, Mo.	{ J. June 2, 1880 M. Oct. 6, 1886
CROSBY, HORACE	Eng. of Sewers, New Rochelle, N. Y.	Feb. 17, 1869
CROSBY, WILSON	125 Hammond st., Bangor, Maine.	Sept. 15, 1869
CROWELL, J. FOSTER	Cons. Civil Eng., Welles Bldg., 18 Broadway, New York City.	Dec. 1, 1880
CULYER, JOHN Y.	Civ. Eng. and Landscape Archi- tect, Potter Bldg., Park Row and Beekman st., New York City.	Feb. 17, 1869
CUNNINGHAM, DAVID W.	Grandin, Cass Co., North Dakota.	May 7, 1873
CUNNINGHAM, JAMES H.	4 Magdala Crescent, Edinburgh, Scotland.	Aug. 6, 1879
CURRIE, DANIEL McN.	U. S. Asst. Eng., Room 428 Cust- om House, St. Louis, Mo.	May 5, 1880
CURTIS, FAYETTE S.	Ch. Eng., New York, New Haven & Hartford R.R., New Haven, Conn.	April 3, 1889
CURTIS, WENDELL R.	Civil Eng., Savannah, Ga.	{ J. March 3, 1875 M. June 4, 1884
CURTIS, WALTER W.	Civil Eng., 557 Drake Block, St. Paul, Minn.	Sept. 5, 1888
CURTIS, W. G.	Asst. to Gen. Man., Eng. Maint. Way Southern Pacific Company (Pacific System), San Francisco, Cal.	May 3, 1882
CUTSHAW, W. E.	City Eng., Richmond, Va.	March 4, 1891
DAGRON, JAMES G.	Eng. Bridges, Baltimore & Ohio R. R., Baltimore, Md.	Oct. 6, 1886
DARLINGTON, FRANK G.	Supt. Indianapolis Div. P. C. C. & St. L. Ry., Union Station, Indianapolis, Ind.	{ J. Feb. 6, 1884 M. April 6, 1887
DARRACH, CHARLES G.	(Civil and Hydr. Eng., Wilson Bros. & Co.), Drexel Bldg., Phila- delphia, Pa.	Jan. 5, 1886
DAVIS, CHARLES	County Eng., Pittsburgh, Pa. (72 Western ave., Alleghany City, Pa.)	Sept. 15, 1869
DAVIS, CHARLES E. L. B.	Maj. Corp. of Eng. U. S. A., P. O. Drawer 7, Milwaukee, Wis.	July 12, 1887
DAVIS, CHESTER B.	Cons. Eng., Room 549-551, The Rookery Bldg., Chicago, Ill.	Feb. 1, 1882
DAVIS, FRANK P.	Div. Eng., Nicaragua Canal Cons. Co., San Juan del Norte, Nica- ragua.	Feb. 1, 1888

Name.	Address.	Date of Membership.
DAVIS, JOSEPH P.	Cons. Eng., 113 West 38th st., New York City,	Jan. 29, 1868
DAVIS, ROB B.	Man. Bridge and Constr. Dept., Pencoyd Iron Works, Pencoyd, Pa.	July 3, 1889
DAVISON, GEORGE S.	Gen. Supt. P. C. & Y. Ry. (Wilkins & Davison, Civ. Engs.), Westinghouse Bldg., Pittsburgh, Pa.	April 2, 1890
DAWLEY, EDWIN P.	Ch. Eng. New York, Providence & Boston R. R., Providence, R. I.	April 1, 1885
DEANS, JOHN STERLING	Asst. to Ch. Eng., The Phoenix Bridge Co., Phoenixville, Pa.	May 4, 1887
DECOURCEY, BOLTON W.	Eng. Harbor Line Comm., State of Washington, 342 Kelly st., Portland, Ore.	Nov. 6, 1889
DEFREES, MORRIS M.	Room 53, Ingalls Block, Indianapolis, Ind.	March 3, 1880
DEFUNIAK, FREDERICK	Cons. Eng. and Ry. Expert, 204 East Chestnut st., Louisville, Ky.	May 7, 1873
DELAFIELD, CLARENCE	2 Wall st., New York City.	Feb. 1, 1888
DEMPSTER, ALEXANDER	Stanton and Euclid st., Pittsburgh, Pa.	Nov. 5, 1879
DENNIS, WILLIAM F.	(Eggleston & Dennis, Civil Engs.), Shafer Bldg., Richmond, Va.	Feb. 1, 1888
DERRICK, HENRY C.	Houston, Halifax Co., Va.	Oct. 5, 1887
DEVIN, GEORGE	(Care Theodore Cooper), 35 Broadway, New York City.	Sept. 7, 1887
DEYO, S. L. F.	Div. Eng. New York, New Haven & Hartford R. R., 10 East 119th st., New York City.	June 6, 1888
DICKINSON, GEORGE C.	Cobham, Albemarle Co., Va.	Feb. 5, 1890
DICKINSON, POMEROY P.	Cons. Eng., 7 Nassau st., New York City.	Jan. 17, 1872
DIDIER, PAUL	Ch. Eng. Pittsburgh & Western R. R., Allegheny, Pa.	March 6, 1889
DILLMAN, GEORGE L.	Eng. Portland Cons. Co., Portland, Ore.	March 4, 1891
D'INVILLIERS, CAMILE S.	Philipsburgh, Pa.	Jan. 4, 1888
DOANE, EDWIN A.	Contracting Eng., Atlanta, Ga., (P. O. Address, Hapeville, Ga.)	June 7, 1876
DOANE, THOMAS	Civil and Cons. Eng., 8 Pearl st., Charlestown, Mass.	June 7, 1882
DOANE, WALTER A.	Prin. Asst. Eng. Ohio Extension, Norfolk & Western R. R., Kenova, W. Va.	Sept. 7, 1881
DODGE, JOSEPH T.	1818 Broadway, West Superior, Wis.	April 6, 1887

Name.	Address.	Date of Membership.	
DONOVAN, JOHN J.	Ch. Eng., Fairhaven & South- ern R. R., Fairhaven, Wash.	J. April 7, 1886	M. April 4, 1888
DORAN, FRANK C.	Eng. and Gen. Road Mast. C. & W. I. R. R. and the Belt Ry. of Chicago, Chicago, Ill.	Sept. 5, 1883	
DORSEY, EDWARD BATES	(Care Am. Soc. C. E.) 127 E. 23d st., New York City.	June 4, 1879	
DOUGLAS, BENJAMIN	Bridge Eng. Mich. Cent R. R., Detroit, Mich.	J. June 1, 1887	M. Jan. 2, 1890
DOUGLAS, HENRY T.	Ch. Eng. Baltimore & Ohio R. R., Baltimore, Md	July 6, 1887	
DOWNE, GEORGE	Supt. Motive Power New South Wales Govt. Steam Tramways, Randwick, Sydney, New South Wales, Australia.	Sept. 5, 1883	
DRAKE, WILLIAM A.	Pueblo, Col.	Dec. 5, 1883	
DUBARRY, JOSEPH N.	Second Vice-Pres. Penn. R. R., 233 South 4th st., Philadelphia, Pa.	Jan. 6, 1875	
DUN, JAMES	Ch. Eng. A. T. & S. F. R. R., Topeka, Kans.	June 7, 1876	
DUNKLEE, JOHN B.	Asst. Eng., Potomac River Im- provement, 601 18th st., N. W., Washington, D. C.	April 2, 1873	
DUNHAM, H. F.	(Dunham & Paine, Civil Engs.), 150 Broadway, New York City, and City Hall Bldg., Cleveland, Ohio	Oct. 1, 1890	
DUNLAP, DE CLERMONT	City Eng. and Supt. of Sewers, Rockford, Ill.	Jan. 4, 1888	
DURHAM, C. WHEELER	Pres. and Gen. Man. The Durham House Drainage Co. of New York, 158 and 160 West 27th st., New York City.	April 4, 1877	
EARLEY, JOHN E.	Tehuacan, Puebla, Mexico.	April 5, 1876	
EATON, FREDERICK	City Eng., Los Angeles, Cal.	May 5, 1886	
EAYRS, NORMAN W.	Gen. Man. Wheeling Bridge and Terminal Ry., Wheeling, W. Va.	June 3, 1885	
ECKART, WILLIAM R.	Mech. Eng., (P. O. Box 1844), 217 Sansome st., Rooms 2 and 3, San Francisco, Cal.	Jan. 5, 1881	
ECKERT, EDWARD W.	34 W. 38th st., New York City	Feb. 3, 1886	
EDWARDS, HARRY W.	Asst. Eng. Great Northern Ry., St. Paul, Minn.	June 4, 1890	
EDWARDS, NATHANIEL M.	Appleton, Wis.	June 14, 1874	

Name.	Address.	Date of Membership.
EGGLESTON, T. C.	Civil Eng., Box 186, Richmond, Va.	Dec. 7, 1887
EGLESTON, THOMAS	Prof. School of Mines, Columbia College, 35 West Washington sq., New York City.	March 5, 1879
ELLIOT, CHARLES D.	Somerville, Mass.	Aug. 7, 1872
ELLIOTT, CHAS. GLEASON	Civil Eng., Bloomington, Ill.	Sept. 3, 1890
ELLIS, S. CLARENCE	Ch. Eng. Board of Survey, 328 Exchange Bldg., 53 State st., Boston, Mass.	Aug. 7, 1872
ELMER, HOWARD NIXON	Man. Western Office, New Jersey, Steel and Iron Co., St. Paul, Minn.	April 7, 1886
ELWELL, CHARLES C.	Div. Eng. Main. Way, Pittsburgh Div. B. & O. R. R., Pittsburgh, Pa.	July 1, 1891
ELY, THEODORE N.	Gen. Supt. Motive Power Penn. R. R., Altoona, Pa.	March 2, 1881
EMERSON, GEORGE D.	Hancock, Mich.	Sept. 18, 1872
EMERY, CHARLES E.	Cons. Eng., 22 Cortlandt st., New York City.	May 6, 1874
ENDICOTT, MORDECAI T.	Civil Eng. Bureau of Yards and Docks, U. S. Navy Dept., Washington, D. C.	April 7, 1877
ENGLE, ROBERT L.	Eng. in Charge Louisville & Jeffersonville Bridge, 736 Westminster ave., Cincinnati, Ohio.	Sept. 7, 1881
ERNST, OSWALD H.	Col. U. S. A., Maj. Corps Engs., War Dept., Washington, D. C.	July 4, 1888
EVANS, GEORGE E.	Civil Eng., 87 Wilder st., Lowell, Mass.	May 2, 1888
EVANS, LOUIS H.	Div. Eng. Chicago & Northwestern Ry., 22 5th ave., Room 30, Chicago, Ill.	July 3, 1889
EVANS, LOUIS P.	(Cofrode & Evans, Engs. and Contractors.) S. E. cor. 4th and Walnut sts., Philadelphia, Pa.	Sept. 3, 1884
FANNING, JOHN T.	Cons. Eng. Kasota Block, Minneapolis, Minn.	Aug. 7, 1872
FARLEY, GEORGE M.	Supervisor Penna. Co., New Brighton, Pa.	April 6, 1887
FARNHAM, ROSCOE E.	Civil Eng., 234 La Salle st., Room 60, Chicago, Ill.	Jan. 2, 1890
FARNUM, HENRY H.	Eng. of Sewers, 141st st. and Third ave., New York City.	Sept. 7, 1887
FAVA, FRANCIS R., Jr.	Coreoran Bldg., Washington, D. C.	July 1, 1891
FEIND, BERNHARD	First Asst. City Eng., City Hall, Chicago, Ill.	Nov. 5, 1890
		Jan. 2, 1890.

Name.	Address.	Date of Membership.
FELTON, HERBERT C.	Supt. Delaware River Ferry Co., Camden, N. J.	June 1, 1887
FELTON, SAMUEL M.	Pres. East Tenn. Va. & Ga. Ry. and C. N. O. & T. P. Ry., 80 Broadway, New York City.	Jan. 4, 1882
FERGUSON, JOHN W.	Supt. A. J. McBean, Con- } J. tractor, Metuchen, N. J. } M.	Feb. 2, 1881 Feb. 2, 1887
FERRY, CHARLES A.	Asst. City Eng., 18 City Hall, } J. New Haven, Conn. } M.	May 4, 1881 Jan. 2, 1889
FIELD, BURR K.	Vice-Pres. The Berlin Iron Bridge Co., East Berlin, Conn.	Oct. 1, 1884
FIELD, GEORGE S.	Union Bridge Co., Buffalo, N. Y.	April 7, 1880
FIELDS, SAMUEL J.	Civil Eng., 564 Ellicott st., Buffalo, N. Y.	March 5, 1884
FIESER, L. F.	210 S. High st., Columbus, Ohio.	Jan. 2, 1890
FILLEY, HIEL H.	Ch. Eng. Mex. Nat. Cons. Co., Baird Bldg., Kansas City, Mo.	Jan. 3, 1883
FINK, ALBERT	( <i>Past - President.</i> ) Civil Eng., Louisville, Ky.	July 20, 1870
FINK, RUDOLPH	Pres. and Gen. Man. Little Rock & Memphis R. R., Little Rock, Ark.	Sept. 21, 1870
FINNEY, FREDERICK N.	Pres. Minn., St. Paul & Sault Ste. Marie Ry., and Vice-Pres. D. S. S. & A. Ry., Minneapolis, Minn.	Sept. 3, 1889
FIRMSTONE, FRANK	Easton, Pa.	Aug. 7, 1878
FISHER, CLARK	Fisher Rail Joint Works, Trenton, N. J.	Oct. 19, 1870
FISHER, EDWIN A.	Supt. Pittsburgh Div. Western New York & Penn. R. R., 294 Troup st., Rochester, N. Y.	July 4, 1888
FISHER, FRANCIS DAVIS	Res. Eng. Suburban Rapid Transit Co. (Residence, 19 West 125th st., New York City.)	May 2, 1888
FITCH, ASA B.	1304 South 6th st., Terre Haute, Ind.	May 5, 1884
FITZGERALD, DESMOND	Res. Eng. Additional Supply Boston Water Works, Brookline, Mass.	Sept. 3, 1884
FITZGERALD, J. LELAND	City Eng., Wedge Bldg., Schenec- tady, N. Y.	Jan. 2, 1889
FLAD, EDWARD	(Johnson & Flad, Civil and Mech. Engs.,) 48 Laclede } J. Bldg., St. Louis, Mo. } M.	Jan. 7, 1885 Feb. 1, 1888
FLAD, HENRY	( <i>Past-President.</i> ) 3400 Franklin ave., St. Louis, Mo.	Feb. 15, 1871
FLAGG, J. FOSTER	(Care Am. Soc. C. E.) 127 East 23d st., New York City.	Oct. 7, 1874



Name.	Address.	Date of Membership.
FLEMING, SANDFORD	Ottawa, Canada.	Sept. 18, 1872
FLYNN, PATRICK J.	Cons. Eng., Eng. in chg. Inter- cepting Sewer, 118 S. Hill st., Los Angeles, Cal.	Feb. 4, 1891
FOOTE, ARTHUR D.	Cons. Eng. Idaho Mining and Irrigation Co., Boise City, Idaho.	May 7, 1884
FORCE, CYRUS G.	Ch. Eng. Dept. Public Works, Cleveland, Ohio.	Feb. 6, 1878
FORD, P. D.	Ch. Eng. Long Island R. R., Long Island City, N. Y.	March 5, 1890
FORNEY, MATTHIAS N.	17 East 38th st., New York City.	Sept. 6, 1871
FORSYTH, ROBERT	Ch. Eng. Illinois Steel Co., 1035 Rookery Bldg., Chicago, Ill.	May 12, 1875
FOSTER, WILBUR F.	Eng. and Contractor, 3 Berry Block, Nashville, Tenn.	May 7, 1873
FOUQUET, JOHN DOUGLAS	Architect, Fishkill, N. Y.; Room 48, Grand Central Station, New York City.	June 3, 1885
FOX, S. WATERS	Div. Eng. to Missouri River { J. July 7, 1880 Comm. (P. O. Box 954), St. { M. Oct. 6, 1886 Joseph, Mo.	
FRANCIS, GEORGE B.	Prin. Asst. Eng. New York, { J. Sept. 5, 1883 Providence & Boston R. R., { M. Nov. 7, 1888 Providence, R. I.	
FRANCIS, HENRY N.	Asst. Eng. City Engrs. Office, { J. March 1, 1876 Providence, R. I. { M. Nov. 7, 1888	
FRANCIS, JAMES B.	( <i>Past-President.</i> ) Cons. Eng. Pro- prietors of Locks and Canals on Merrimack River, Lowell, Mass.	Nov. 5, 1852
FRANKLIN, WILLIAM B.	Hartford, Conn.	April 1, 1874
FRAZIER, HARRY	Ch. Eng. Chesapeake & Ohio Ry., Richmond, Va.	May 1, 1889
FRAZIER, JAMES L.	Supt. Newport News & Mississippi Valley Co., Louisville, Ky.	Sept. 1, 1880
FREEMAN, JOHN R.	Eng. and Asst. Ch. of Insp. { and Adj. Dept. Assoc. { J. June 7, 1882 Factory Mutual Ins. Co., { M. April 3, 1889 31 Milk st., Room 55, Boston, Mass.	
FRITH, ARTHUR J.	New Brighton, Richmond Co., N. Y.	Jan. 3, 1883
FRIZELL, JOSEPH P.	Ch. Eng. Board Public Works. Austin, Texas. (60 Congress st., Boston, Mass.)	Jan. 3, 1883
FTELEY, ALPHONSE	( <i>Vice-President.</i> ) Ch. Eng. Aque- duct Commission, 213 Stewart Bldg., New York City.	Jan. 5, 1876

Name.	Address.	Date of Membership.
FUERTES, ESTEVAN A.	Director College of Civil Engineering, Cornell University, Ithaca, N. Y.	Feb. 17, 1869
FULLER, EUGENE F.	Hydr. Eng., 11 Wall st., New York City.	May 5, 1886
FULLER, FRANKLIN I.	Box 653, Portland, Oregon.	Jan. 6, 1886
FULLER, FRANK L.	Civil Eng., Boston, Mass. { J.	April 4, 1883
		{ M. April 4, 1888
FULLER, SIDNEY T.	P. O. Box 37, Kennebunk, Maine.	May 3, 1871
FULTON, JOHN A.	Bridge Eng. Lake Shore & Mich. Southern Ry., Cleveland, Ohio.	May 4, 1887
GAMBLE, FRANCIS C.	Res. Eng. in British Columbia, Dept. Pub. Works of Canada, Victoria, B. C.	April 1, 1891
GARDINER, EDMUND L. B.	Eng. Dundee Water Power and Land Co., Passaic, N. J.	June 7, 1882
GARDNER, G. CLINTON	Greenfield, Mass.	Nov. 3, 1875
GATCHELL, GEORGE S.	Man. Assoc. Elevators, Buffalo, N. Y.	May 7, 1884
GATES, CHRISTOPHER L.	Eng. Smith Bridge Co., Toledo, Ohio. { J.	Dec. 4, 1878
		{ M. Sept. 5, 1883
GATES, HORACE D.	Dep. City Eng., 515 Devisadero st., San Francisco, Cal.	March 7, 1883
GAY, CHARLES W.	City Eng., City Hall, Lynn, Mass.	May 6, 1891
GAY, MARTIN	Asst. Eng. Dept. Public Works, New York City, { J.	June 4, 1884
	West New Brighton, N. Y. { M.	June 5, 1889
GAYLER, CARL	Bridge Eng., City Hall, St. Louis, Mo.	Sept. 3, 1884
GEDDES, JAMES K.	Ch. Eng. and Road Mast, Bellaire, Zanesville & Cincinnati Ry., Zanesville, Ohio.	Jan. 2, 1890
GELETTE, WILLIAM D.	(Care Ch. Eng. Southern Pacific Co.) cor. 4th and Townsend sts., San Francisco, Cal.	April 1, 1885
GERBER, EMIL	Asst. Eng. with George S. Morison, The Rookery, Chicago, Ill.	Feb. 1, 1888
GERMANN, FRANZ	38 Ahumada, Santiago, Chili.	April 3, 1889
GIAVER, J. G.	Shiffler Bridge Works, Pittsburgh, Pa.	July 3, 1889
GIBBS, CHARLES W.	Ch. Eng. Rio Grande Southern R. R., Ridgway, Colo.	Jan. 2, 1889
GIELOW, HENRY J.	Eng. and Naval Architect, 229 Broadway, New York, City.	Dec. 6, 1882
GILBERT, CHARLES PHELPS	Sec. and Gen. Man. Edison Illuminating Co., Detroit, Mich.	Feb. 6, 1878

Name.	Address.	Date of Membership.	
GILLETTE, EDWARD, JR.	(Care B. & M. Engineer Office), Lincoln, Neb.	July	3, 1889
GILLHAM, ROBERT	Cons. Eng., 45 Broadway, New York City.	June	2, 1886
GLADDING, HENRY H.	30 Stanley st., New Haven { J. Conn. { M.	July	1, 1885
GLOVER, OLIVER L.	La Union, Salvador, Central Amer- ica.	Jan.	4, 1888
GODDARD, CHARLES E.	185 St. James st., Montreal; 2 To- ronto st., Toronto, Canada; and 53 New Broad st., London, E. C., England.	April	3, 1878
GOLAY, PHILIP	Asst. U. S. Eng. in chg. Locks and Dams, Monongahela River, Morgantown, W. Va.	Sept.	7, 1881
GOLDMARK, HENRY	Civil Eng., Thayer Bldg., { J. Kansas, City, Mo. { M.	Sept.	5, 1877
GOODRICH, WILBUR F.	10 Gibbens st., Somerville, Mass.	May	7, 1884
GOODWIN, H. STANLEY	Gen. Eastern Supt. Lehigh Valley R. R., South Bethlehem, Pa.	June	6, 1888
GOODWIN, JOHN M.	Member Lake Erie & Ohio River Ship Canal Com., Sharpsville, Mercer Co., Pa.	May	4, 1887
GOTTLIEB, ABRAHAM	Major Block, Room 75, Chicago, Ill.	July	20, 1870
GORDON, ROBERT	(Care H. S. King & Co.), 45 Pall Mall, London, England.	Sept.	4, 1872
GOULD, E. SHERMAN	Cons. Eng. Vento Water Works, Havana, Cuba. (Address: Care Runkle, Smith & Co., 15 Wall st., New York City.)	Sept.	4, 1872
GOULD, WILLIAM T.	Asst. Eng. Wiggins Ferry Co., Republic Bldg., St. Louis, Mo.	Feb.	4, 1882
GOWEN, CHARLES SEWALL	Div. Eng. New York Aqueduct Com., Sing Sing, N. Y.	Nov.	4, 1885
GRAHAM, CHARLES H.	Asst. Eng. Department Public Parks, Lorillard Mansion, Bronx Park (Residence, 445 East 117th st.), New York City.	Jan.	2, 1890
GRANT, EMERSON W.	Box 95, Topeka, Kans.	March	7, 1888
GRANT, WILLIAM H.	1828 Jefferson pl., Washington, D. C.	Sept.	7, 1887
GRAY, GEORGE E.	1115 Bush st., San Francisco, Cal.	Dec.	4, 1889
GRAY, SAMUEL M.	Cons. Eng., Providence, R. I.	July	2, 1873
GREEN, BERNARD R.	Supt. and Eng. Bldg for Library of Congress, Washington, D. C.	July	2, 1873
GREENE, BENJAMIN D.	50 Broadway, New York City.	May	15, 1872
		Oct.	2, 1889
		Nov.	4, 1885

Name.	Address.	Date of Membership.	
GREENE, CHARLES E.	Prof. of Civil Engineering University of Michigan, Ann Arbor, Mich.	Jan.	4, 1882
GREENE, DAVID M.	Director Rensselaer Polytechnic Institute, 41 First st., Troy, N. Y.	May	20, 1868
GREENE, EDWARD A.	Mass. and Southern Cons. Co., 7 Nassau st., New York City.	July	4, 1888
GREENE, FRANCIS VINTON	Vice-Pres. Barber Asphalt Paving Co., 1 Broadway, New York City.	June	3, 1885
GREENE, GEORGE S., Jr.	Eng. in chf. Department of Docks, Pier A. Battery Place, New York City.	Dec.	4, 1867
GREENE, JOSEPH N.	Ch. Eng., Maine Shore Line R. R., Bangor, Me.	Oct.	5, 1887
GREENOUGH, MALCOLM S.	Eng. Boston Gas Light Co., 24 West st., Boston, Mass.	Dec.	4, 1878
GREINER, JOHN E.	Asst. Eng. B. & O. R. R., Baltimore, Md.	June	4, 1890
GRIMM, CARL R.	Eng. Tacony Iron and Metal Co., Tacony, Philadelphia, Pa.	June	4, 1890
GRIMSHAW, J. WALTER	Australian Club, Bent st., Sydney, New South Wales, Australia.	Nov.	7, 1888
GRISWOLD, FRANK L.	Cosmos Club, Buenos Ayres, Argentine Republic.	May	2, 1883
GUNNELL, WILLIAM C.	600 20th st., Washington, D. C.	Feb.	7, 1877
GUTHRIE, EDWARD B.	Deputy City Eng., 13 City Hall, Buffalo, N. Y.	Sept. { A. Oct. { M.	3, 1884 5, 1887
GZOWSKI, SIR CASIMIR S.	The Hall, Toronto, Canada,	Dec.	2, 1868
HAIGHT, STEPHEN S.	City Surveyor and Civil Eng., West Farms, New York City.	June	1, 1881
HAINES, HENRY S.	Vice-Pres. Plant System and Plant Investment Co., 12 W. 23d st., New York City.	Nov.	2, 1887
HAINS, PETER C.	Lt. Col. Corps of Eng., U. S. A., 601 18th st., N. W., Washington, D. C.	April	2, 1890
HALE, RICHARD A.	Prin. Asst. Eng. Essex Co., Lawrence, Mass.	Feb. { J. July { M.	6, 1884 1, 1891
HALL, JULIEN A.	First Asst. Eng. Richmond & Danville R. R., Atlanta, Ga.	June	5, 1889
HALL, WILLIAM HAMMOND	Cons. Civil Eng., 79 Flood Bldg., San Francisco, Cal.	Jan.	2, 1884
HAMBLETON, FRANCIS H.	Cons. Eng., 8 South st., Baltimore, Md.	March	5, 1873

Name.	Address.	Date of Membership.	
HAMILTON, WILLIAM G.	105 East 21st st., New York City.	Oct.	7, 1868
HANDY, EDWARD A.	Ch. Eng. Lake Shore & Michigan Southern Ry., Cleveland, Ohio.	Jan.	2, 1889
HANNAFORD, EDMUND P.	Ch. Eng. Grand Trunk R. R., Montreal, Canada.	Sept.	18, 1872
HARDING, GEO. EDWARD	Civil Eng. and Architect, 40 Exchange pl., New York City.	March	3, 1875
HARDING, HENRY	Civil and Hydr. Eng., Bridgeport, Conn.	May	7, 1873
HARDY, GEORGE R.	Asst. Man. United Elec. Light & Power Co., Times Bldg., New York City.	Nov.	7, 1888
HARISON, R. MORLEY	228 West Regent st., Glasgow, Scotland.	May	6, 1885
HARLOW, JAMES H.	Eng. and Contractor, 108 4th ave., Pittsburgh, Pa.	March	4, 1874
HARLOWE, CHARLES	Div. Eng. N. P. R. R., Centralia, Wash.	Sept.	7, 1887
HARRIS, ROBERT L.	Civil Eng., 195 Washington Bldg., 1 Broadway, New York City,	May	3, 1876
HARRIS, WILLIAM P.	Johnson City, Tenn.	June	1, 1881
HARRISON, EDLOW W.	Rooms 23-26, Fuller Bldg., Jersey City, N. J.	June	3, 1885
HARROD, BENJAMIN M.	City Eng., New Orleans, La.	April	7, 1877
HASELL, BENTLEY D.	Railway Com. Merchant and Manufacturers' Agent; Sec. and Treas. Coastwise S. S. Assoc'n, 66 Pine st., New York City. (Residence, Brooklyn, N. Y.)	July	3, 1878
HASKINS, WILLIAM J.	Civil Eng. and Contractor, { 41 W. 105th st., New York City.	{ J. March 7, 1883 M. Dec. 1, 1886	
HASWELL, CHAS. HAYNES	Civil and Mech. Eng., 42 Broadway, New York City.	Jan.	29, 1868
HATCH, F. T.	Eng. Main. Way P. C. & St. L. Ry., 2 Carson st., Pittsburgh, Pa.	Dec.	4, 1889
HAUPT, LEWIS M.	Prof. Civil Eng. Univ. Pennsylvania, Philadelphia, Pa.	June	6, 1888
HAVEN, WILLIAM A.	Helena, Montana,	March	5, 1873
HAVILAND, ARTHUR	Asst. Eng. New York Central & Hudson River R. R., Room 9, Grand Central Station, New York City.	{ J. Jan. 4, 1882 M. Jan. 4, 1888	
HAWKS, JAMES D.	Ch. Eng. Michigan Central R. R., Detroit, Mich.	Dec.	3, 1884
HAYES, EDMUND	Union Bridge Co., Buffalo, N. Y.	{ J. March 6, 1878 M. March 5, 1884	



Name.	Address.	Date of Membership.
HAYES, R. SOMERS	32 Nassau st. (Residence, 39 West 38th st.), New York City.	Sept. 6, 1882
HAZELTON, CHARLES W.	Eng. and Treas. Turners Falls Water Power Co., Turners Falls, Mass.	Jan. 7, 1891
HAZLEHURST, GEORGE B.	Gen. Supt. Motive Power Baltimore & Ohio R. R., Mt. Clare, Baltimore, Md.	Feb. 1, 1888
HEALD, SIMPSON C.	South Framingham, Mass.	Nov. 4, 1885
HEGEMAN, ALLEN B.	Div. Eng. Inter-oceanic Ry., Tepeyahualco, Puebla, Mexico.	Feb. 1, 1888
HEGEMAN, WILLIAM W.	40 Wall st., New York City.	Feb. 6, 1884
HEMBERLE, EDWARD	14 Douglas st., Carlsruhe, Baden, Germany.	Jan. 7, 1874
HENDERSON, JOHN B.	Brisbane, Queensland, Australia.	June 4, 1890
HENNING, CHARLES S.	Pres. Cherokee Coal Mining Co., Cherokee, Kans.	Jan. 7, 1885
HENNY, DAVID C.	203 People's Bank Bldg., Denver, Colo.	Sept. 7, 1887
HENRY, D. FARRAND	Detroit, Mich.	July 7, 1875
HENTHORN, JOHN T.	(Remington & Henthorn, Cons. and Mech. Engs.), 146 Westminster st., Providence, R. I.	Dec. 3, 1884
HERBERT, ARTHUR P.	Eng. and Supt. Colima Div. Mex. Nat. Cons. Co., Colima, Mexico.	Sept. 5, 1888
HERING, RUDOLPH	(Director.) Civil and Sanitary Eng., 277 Pearl st., New York City.	Jan. 5, 1876
HERMANN, EDWARD A.	Asst. Eng. Street Comm. Dept., 2608 Lafayette ave., St. Louis, Mo.	April 6, 1887
HERMANY, CHARLES	(Vice-President.) Ch. Eng. and Supt. Water Works, 549 3d st., Louisville, Ky.	Jan. 6, 1869
HERRICK, HENRY A.	Res. Eng. Wash. Water Power Co., Spokane Falls, Wash.	May 7, 1890
HERSCHEL, CLEMENS	(Director.) Eng. and Supt. East Jersey Water Co., 2 Wall st., New York City.	April 21, 1869
HEUER, WILLIAM H.	Major Corps Engs., U. S. A., Room 89, Flood Bldg., San Francisco, Cal.	March 3, 1880
HEWITT, CHARLES E.	Eng. N. J. Steel and Iron Co., Trenton, N. J.	Oct. 5, 1887
HIDER, ARTHUR	U. S. Asst. Eng., Res. Eng. in local charge of improvements Lake Providence Reach, Miss. River, Greenville, Miss.	Sept. 7, 1881

Name.	Address.	Date of Membership.	
HILBERT, HELIODORE J.	Civil Eng., 335 National ave., Milwaukee, Wis.	April	1, 1885
HILGARD, K. EMIL	Bridge Eng. N. P. R. R., St. Paul, Minn.	June	4, 1890
HILL, ALBERT B.	City Eng., New Haven, Conn.	{ J. Feb. 2, 1876 M. March 5, 1884	
HILL, JOHN W.	Cons. Eng. Water Works and Sewerage, Glenn Bldg., Rooms 21-22, Cincinnati, O.		
HILL, WARREN E.	Vice-Pres. The Continental Iron Works, Brooklyn, N. Y.	May	7, 1873
HILLMAN, CHARLES F.	Civil Eng., Box 185, Santiago, Chili.	July	5, 1876
HILLS, FRANCIS L.	Ch. Eng. W. & N. R. R., Wilmington, Del.	March	4, 1891
HILTON, GEORGE PORTER	Eng. Hilton Bridge Cons. Co., Albany, N. Y.	May	1, 1889
HINCKLEY, HOWARD V.	Office Eng. Atchison, Topeka & Santa Fé R. R., Topeka, Kansas.	Dec.	5, 1883
HINCKLEY, JOHN F.	Civil Eng. and Contractor, 2017 Rutgers st., St. Louis, Mo.	May	6, 1885
HOAG, SIDNEY W., Jr.	Asst. Eng. Dept. of Docks, 1718 Madison ave., New York City.	Sept.	2, 1885
HOBSON, JOSEPH	Ch. Eng. Great West. Div. Grand Trunk Ry.; Ch. Eng. St. Clair Tunnel Co., Hamilton, Canada.	Feb.	5, 1890
HODGDON, FRANK W.	Asst. Eng. Mass. Harbor and Land Commission, 65 Bowdoin st., Boston, Mass.	Dec.	3, 1884
HODGES, ARTHUR	Ch. Eng. West End St. Ry., 81 Milk st., Boston, Mass.	May	2, 1888
HODGES, GILBERT	Civil and Cons. Eng., 19 Exchange pl., Room 17, Boston, Mass.	June	4, 1890
HOFF, OLAF	Bridge Eng., 602 and 603 Oneida Block, Minneapolis, Minn.	May	6, 1885
HOLBROOK, FRED'K W. D.	Sec. Board Public Works, P. O. Box 194, Seattle, Wash.	Oct.	6, 1886
HOLBROOK, HENRY R.	Pueblo, Colo.	Jan.	2, 1890
HOLMAN, M. L.	Water Commr., 3744 Finney ave., St. Louis, Mo.	April	2, 1884
HOLT, HERBERT S.	Civil Eng., Room 4, Windsor Hotel, Montreal, Canada.	March	6, 1889
HOOVER, JOSEPH W.	Eng. and Gen. Agt. Wrought-Iron Bridge Co., 835-837 N. Y. Life Bldg., Kansas City, Mo.	June	6, 1888
HOPKINS, CHAS. COMSTOCK	Rome, N. Y.	June	4, 1890
HORTON, HORACE E.	Pres. Chicago Bridge and Iron Co., Tracy P. O., Chicago, Ill.	Sept.	6, 1882

Name.	Address.	Date of Membership.
HOUSE, BRUCE F.	Civil Eng., Elec. L. & P. Co., 324 West 13th ave., Denver, Colo.	April 4, 1888
HOUSTON, JOHN	1659 Lexington ave., New York City.	May 6, 1868
HOWARD, FREDERICK B.	Room 41, Newberry & McMillan Bldg., Detroit, Mich.	March 3, 1875
HOWE, EDWARD W.	Asst. Eng., in chg. Park Construction, City Engineer's Office, Boston, Mass.	Nov. 6, 1878
HOWE, MILTON G.	Receiver Houston, East & West Texas and Shreveport & Houston Rys., Houston, Tex.	Sept. 7, 1887
HOWELL, GEORGE W.	Commr. Passaic River Drainage, Morristown, N. J.	Oct. 16, 1872
HOWLAND, ARTHUR H.	71 Equitable Bldg., Boston, Mass.	May 2, 1888
HOXIE, R. L.	Capt. Corps of Engs., U. S. A., Willetts Point, Whitestone P. O., N. Y.	June 2, 1886
HOYT, WILLIAM E.	Ch. Eng. Buffalo, Rochester & Pittsburgh Ry., Rochester, N. Y.	March 5, 1884
HUDSON, JOHN R.	320 Sansome st., San Francisco, Cal.	May 4, 1887
HUGHES, WILLIAM M.	Eng. of Cons. World's Columbian Exposition, 1143 The Rookery, Chicago, Ill.	June 2, 1880
HUMPHREYS, DAVID C.	Prof. Applied Mathematics, Washington & Lee University, Lexington, Va.	Nov. 2, 1887
HUNT, ALFRED E.	Pres. Pittsburgh Reduction Co., 95 Fifth ave., Pittsburgh, Pa.	Sept. 1, 1886
HUNT, CHARLES W.	New Rochelle, N. Y.	Jan. 2, 1884
HUNT, CONWAY B.	Asst. Eng. District of Columbia, District Bldg., Washington, D.C.	Feb. 4, 1891
HUNT, RANDELL	(Doe, Hunt & Co.), 130 Sansome st., San Francisco, Cal.	May 2, 1883
HUNT, ROBERT W.	Mettallurgical Eng., 631 The Rookery Bldg., Chicago, Ill.	June 3, 1885
HUSON, HERBERT S.	Prin. Asst. Eng. Northern Pacific R. R., Tacoma, Wash.	June 2, 1886
HUTTON, WM. RICH	35 Broadway, New York City	Jan. 8, 1873
IVES, CHAUNCEY	Ch. Eng. Cumberland Valley R. R., Chambersburg, Pa.	June 4, 1884
JACKMAN, HOWARD H.	City Eng., Wichita, Kans.	May 6, 1891

Name.	Address.	Date of Membership.	
JACKSON, CHARLES E.	15 Cortlandt st., Room 78, New York City.	June	2, 1886
JACKSON, J. M.	Gen. Supt. and Ch. Eng. Balto. & Eastern Shore R. R., Salisbury, Md.	Sept.	1, 1886
JACKSON, LEWIS B.	Ch. Eng. C. & O. Ry., Cincinnati, Ohio.	June	6, 1888
JACKSON, THOMAS M.	Clarksburg, W. Va.	June	3, 1891
JACKSON, WILLIAM	City Eng., City Hall, Boston, Mass.	Sept.	3, 1884
JAMESON, CHARLES D.	State Univ. of Iowa, Iowa City, Iowa.	March	7, 1888
JAMIESON, J. Q.	531 Hassalo st., East Portland, Ore.	Nov.	6, 1889
JAKUES, W. H.	Ordinance Eng. Bethlehem Iron Co., South Bethlehem, Pa.	July	2, 1890
JARDINE, A. WILLIAM	Brisbane, Queensland, Australia.	April	2, 1890
JARVIS, CHARLES M.	Pres. and Ch. Eng. The Berlin Iron Bridge Co., East Berlin, Conn.	Jan.	7, 1885
JAYCOX, THOMAS W.	P. O. Box 189, Leadville, Colo.	Jan.	4, 1882
JENKINS, WILLIAM DUNBAR	Ch. Eng. New Orleans & Northwestern Ry., Natchez, Miss.	Sept.	7, 1887
JENNINGS, HENRY C.	Cons. Eng., Room 33, Barclay Bldg., Denver, Col.	April	6, 1887
JENNINGS, W. H.	Eng. Main. Way Pittsburgh & Lake Erie R. R., Pittsburgh, Pa.	Sept.	5, 1883
JENNINGS, WILLIAM T.	City Eng., Toronto, Canada.	April	2, 1884
JEWETT, WILLIAM C.	Res. Eng. Cincinnati, New Orleans & Texas Pacific Ry., Chattanooga, Tenn.	June	3, 1885
JOHNSON, CHARLES R.	Pres. Johnson R. R. Signal Co., Rahway, N. J.	June	3, 1885
JOHNSON, JAMES M.	Pres. and Eng. Louisville Bridge & Iron Co., Louisville, Ky.	July	1, 1891
JOHNSON, JOHN B.	Prof. Civ. Eng. Washington University, St. Louis, Mo.	April	7, 1886
JOHNSON, LORENZO M.	Gen. Man. Mexican International Ry., P. O. Box 109, Eagle Pass, Texas.	J.	March 3, 1875
		M.	April 7, 1880
JOHNSON, PHELPS	Ch. Eng. Dominion Bridge Co. (Ltd.), Windsor Hotel, Montreal, Canada.	July	1, 1891
JOHNSON, THOMAS H.	Prin. Asst. Eng. Penna. Lines W. of Ptgh., S. W. System, Pittsburgh, Pa.	Sept.	5, 1887
JOHNSTON, A. LANGSTAFF	Civil and Cons. Eng., 1105 East Main st., Richmond, Va.	June	4, 1890

Name.	Address.	Date of Membership.	
JOHNSTON, HORACE G.	Salina, Kans.	Sept.	7, 1887
JOHNSTON, J. HOWARD	Lima, Peru.	March	1, 1876
JONES, WASHINGTON	Mech. Eng., 1632 North 15th st., Philadelphia, Pa.	Oct.	7, 1874
JORDAN, EDWARD C.	Civil Eng., 31½ Exchange st., Portland, Maine.	May	7, 1890
JUDSON, WM. PIERSON	U. S. Asst. Eng., Oswego, N. Y.	Sept.	7, 1881
JUENGST, HENRY F.	Civil Eng. City Water Co., East St. Louis, Ill.	April	2, 1884
JUST, GEORGE A.	Civil Eng. (Lewinson & Just, Cons. Engs. and Contractors), 90 Nassau st., New York City.	J. Sept. 3, 1884 M. March 4, 1891	
KASTL, ALEX. EDWARD	Chillicothe, Ill.	J. Jan. 4, 1888 M. Nov. 5, 1890	
KATTÉ, WALTER	Ch. Eng. New York Central & Hudson River R. R. and West Shore R. R., Room 48, Grand Central Station (Residence, 523 Madison ave.), New York City.	Oct.	7, 1869
KAUFMAN, GUSTAVE	813 Hamilton Bldg., Pittsburgh, Pa.	May	7, 1890
KEATING, EDWARD H.	City Eng., Duluth, Minn.	June	7, 1882
KEEFER, GEORGE A.	Victoria, British Columbia.	Jan.	2, 1889
KEEFER, THOMAS C.	(Past-President.) Ottawa, Canada.	April	4, 1877
KEITH, GEORGE T.	Box 1921, Montreal, Canada.	May	4, 1881
KEITH, HERBERT C.	Asst. Eng. N. Y. & N. E. R. R., Boston, Mass.	Dec.	4, 1889
KELLEY, HOWARD G.	Res. Eng. and Supt. Bridges and Bldgs. St. Louis Southwestern Ry., Texarkana, Texas.	May	1, 1889
KELLEY, WILLIAM D., Jr.	(Care W. D. Kelley), Kelley's Island, Erie Co., Ohio.	Nov.	2, 1887
KELLOGG, CHARLES	Pres. Elmira Bridge Co. (Ltd.), Elmira, N. Y. (Residence, Athens, Pa.)	June	2, 1880
KELLY, CASSIUS W.	18 City Hall, New Haven, Conn.	J. March 1, 1882 M. June 6, 1888	
KELLY, JOHN P.	249 Eighth st., Troy, N. Y.	March	7, 1890
KELLY, WILLIAM E.	Civ. Eng., New Brunswick, N. J.	Feb.	17, 1869
KENDRICK, JOHN W.	Ch. Eng. Northern Pacific R. R., St. Paul, Minn.	June	6, 1883
KENLY, WILLIAM WATKINS	Eng. Cons. Edge Moore Bridge Works, Wilmington, Del.	Nov.	6, 1889
KENNEDY, JOHN	Ch. Eng. Montreal Harbor Com-mrs., Montreal, Canada.	Sept.	1, 1875



Name.	Address.	Date of Membership.	
KENNEDY, WILLIAM H.	Portland, Ore.	Sept.	6, 1871
KERNOT, WILLIAM C.	Univ. of Melbourne, Victoria, Australia.	March	6, 1889
KIELLAND, S. MUNCH	Div. Eng. Lehigh Valley Ry., cor. Main and Seneca sts, Buffalo, N. Y.	Feb.	6, 1889
KIERSTED, W.	Ch. Eng. The Central Water Works Cons. Co., 509 Baird Bldg., Kansas City, Mo.	Oct.	5, 1887
KILLEBREW, SAMUEL	Ch. Eng. North Div. M. P. Ry., San Juan Bautista, Tabasco, Mexico.	Sept.	2, 1885
KIMBALL, FRANCIS W.	Railway Contractor, Austin, Minn.	May	2, 1883
KIMBALL, GEORGE A.	Civil Eng. Exchange Bldg., } J. Boston, Mass. { M.	May	12, 1875
KIMBALL, GEORGE H.	Late Ch. Eng. Lake Shore & Michigan Southern R. R., Cleveland, Ohio.	July	1, 1891
KINDER, CLAUDE WILLIAM	Eng. in Chf. and Supt. Imperial Chinese Rys., Tientsin, China.	Dec.	3, 1890
KING, FRANK P.	Asst. Ch. Eng. Denver & Rio Grande Ry., 17 Cheesman Block, Denver, Colo.	June	4, 1890
KING, PAUL S.	Ch. Eng. Lehigh Valley Ry., Buffalo, N. Y.	April	3, 1889
KINGMAN, LEWIS	City Eng., Topeka, Kans.	July	3, 1889
KINGSLEY, MARVIN W.	Asst. Eng. Cleveland Water Works, 354 Superior st, Cleveland, O.	July	1, 1885
KINNEY, EDWARD C.	1630 Champa st., Denver, Colo.	July	3, 1878
KINSLEY, THOMAS P.	421 Warren st., Syracuse, N. Y.	May	3, 1882
KIRTLAND, ALFRED P.	Sec. & Treas. Marble Hill Quarry Co., Cheswick, Pa.	Feb.	5, 1873
KITTREDGE, GEO. WATSON	Ch. Eng. C. C. C. & St. L. Ry., Indianapolis, Ind.	Sept.	7, 1887
KNAP, JOSEPH M.	365 West st., New York City.	Jan.	6, 1886
KNAPP, LOUIS H.	Supt. and Eng. Buffalo Water Works, 280 Linwood ave., Buffalo, N. Y.	April	5, 1882
KNIGHT, ALBERT BRUCE	U. S. Deputy Mineral Surv. (P. O. Box 211), Butte, Mont.	March	4, 1874
KUICHLING, EMIL	Ch. Eng. Water Works, 32 City Hall, Rochester, N. Y.	May	7, 1890
LAFON, THOMAS	Columbia, Mo.	Sept.	3, 1884
		{ J.	March 3, 1875
		{ M.	Nov. 5, 1884

Name.	Address.	Date of Membership.	
LANDOR, EDWARD J.	Vice-Pres. and Eng. Wrought Iron Bridge Co., 127 N. Poplar st., Canton, Ohio	March	7, 1888
LANDRETH, OLIN H.	Prof. of Engineering Vanderbilt University and Cons. Eng., Nashville, Tenn.	Sept.	3, 1884
LANDRETH, WILLIAM B.	20 Gillespie st., Schenectady, N. Y.	Oct.	3, 1888
LASSIG, MORITZ	97 Dearborn st., Room 5, Chicago, Ill.	April	2, 1884
LATCHA, JACOB A.	Coldwater, Mich.	May	7, 1873
LATHAM, HARRY H.	Cons. Eng. and Manufr. Machinery, 304 and 306 Dearborn st., Chicago, Ill.	Dec.	2, 1885
LATROBE, CHARLES H.	Gen. Supt. and Eng. Public Parks, 213 East German st., Baltimore, Md.	Nov.	16, 1870
LAWTON, WILLIAM H., Jr.	Civil and San. Eng., Bellevue ave., Newport, R. I.	June	2, 1886
LEAVITT, ERASMUS D.	Cons. Eng. Calumet and Hecla Mine, 2 Central sq., Cambridgeport, Mass.	July	2, 1873
LEAVITT, FRANK M.	Ch. Eng. E. W. Bliss Co., 17 Adams st., Brooklyn, N. Y.	Dec.	2, 1885
LE BARON, JOHN FRANCIS	U. S. Mineral Surveyor and Cons. Eng., Jacksonville, Fla.	June	7, 1882
LE CONTE, LOUIS J.	Asst. U. S. Eng. in chg. Oakland Harbor Works, P. O. Box 358, Oakland, Cal.	April	4, 1877
LEDLIE, CHARLES H.	Cons. Eng., 417 Olive st., St. Louis, Mo.	Jan.	4, 1888
LEDERLE, GEORGE A.	Lock Box 70, Vancouver, Wash.	{ J. May 2, 1883 { M. Oct. 6, 1886	
LEHLBACH, GUSTAV	770 Broad st., Newark, N. J.	March	7, 1883
LEHNARTZ, FREDERICK W.	U. S. Asst. Eng., Grand Rapids, Mich.	Aug.	6, 1879
LEVERICH, GABRIEL	Asst. Eng. N. Y. and Brooklyn Bridge, Nassau st. cor. Washington st., Brooklyn, N. Y. (Residence, Maplewood, N. J.)	July	6, 1870
LEWIS, EUGENE C.	Pres. Sycamore Powder Co., Nashville, Tenn.	March	5, 1873
LEWIS, EVERETT W.	(Address unknown.)	May	2, 1888
LEWIS, SIDNEY F.	State Eng., Cotton Exchange, New Orleans, La.	May	4, 1881
LIBBY, EDMUND D.	41 Reservoir ave., Providence, R. I.	May	6, 1885
LIGHT, ALEXANDER L.	Ch. Eng., Govt. Rys., Province of Quebec, Quebec, Canada.	Sept.	7, 1881

Name.	Address.	Date of Membership.	
LINCOLN, WILLIAM S.	Ch. Eng. Wabash R. R., St. Louis, Mo.	Dec.	5, 1883
LINDENTHAL, GUSTAV	Civil Eng., Lewis Block, Pittsburgh, Pa.	May	3, 1882
LINVILLE, JACOB H.	Cons. Eng., 3610 Walnut st., Philadelphia, Pa.	May	3, 1875
LOCKE, AUGUSTUS W.	Civil Eng., North Adams, Mass.	June,	7, 1882
LOCKE, CHARLES A.	Civil Eng., Nashville, Tenn.	Oct.	3, 1888
LONG, THOMAS J.	(Care Union Bridge Co.), 33 Telephone Bldg., St. Louis, Mo.	J. Nov.	2, 1875
		M. Jan.	7, 1880
LOOMIS, HORACE	Eng. in chg. Sewers, Dept. of Public Works, 31 Chambers st., New York City.	Nov.	5, 1879
LOREE, LEONOR F.	Supt. Cleveland & Pittsburgh R. R., Wellsville, Ohio.	Oct.	6, 1886
LOTZ, WILLIAM H.	Mech. Eng., 68 Metropolitan Block, Chicago, Ill.	Sept.	1, 1875
LOVETT, THOMAS D.	Cons. Eng., 49 West Third st., Cincinnati, Ohio.	May	3, 1871
LOW, EMILE	Eng. in chg. Clinch Valley Div. Norfolk & Western R. R., Cedar Bluff, Va.	May	2, 1888
LOW, GORHAM P.	Gloucester, Mass.	April	21, 1869
LOWETH, CHARLES F.	Cons. Eng., 560 Drake Block, St. Paul, Minn.	J. Jan.	3, 1883
		M. Feb.	6, 1884
LUCAS, D. JONES	(With Wilson Bros. & Co.), 1036 Drexel Bldg., Philadelphia, Pa.	J. Sept.	6, 1876
		M. July	4, 1888
LUCIUS, ALBERT	Civil Eng., 71 Broadway, New York City.	March	3, 1886
LUDLOW, WILLIAM	Maj. of Engs., Bvt. Lt.-Col. U. S. A., Detroit, Mich.	July	5, 1882
LUNDIE, JOHN	Cons. Eng., 1105-1107 The Rookery, Chicago, Ill.	July	4, 1888
LUSK, JAMES LORING	Capt. Corps of Engs., U. S. A., office of Engineer Commr., Washington, D. C.	March	4, 1891
LUTZ, ULYSSES S.	Civil Eng., Holmesburg, Philadelphia, Pa.	July	6, 1887
MACDONALD, CHARLES	Member of the firm, Union Bridge Co., 1 Broadway, New York City.	Sept.	15, 1869
MACFARLANE, JAMES	Ch. Eng. Anaconda Mining Co., Butte, Mont.	April	4, 1888
MACKENZIE, ALEXANDER	Maj. Corps of Engs. U. S. A., Rock Island, Ill.	Feb.	2, 1887

Name.	Address.	Date of Membership.	
MACKLIN, JOHN G.	Ch. Eng. Midland Div. Grand Trunk Ry., Peterborough, Ontario, Canada.	May	4, 1887
MACLAY, WILLIAM W.	Supt. Dept. of Docks, office foot of Chambers st., North River (Residence, 24 West 120th st.), New York City.	Nov.	6, 1872
MACLEOD, JOHN	Cons. Eng., Kentucky National Bank Bldg. (Residence, 1603 Fourth ave.), Louisville, Ky.	July	10, 1872
MACNAUGHTON, JAMES	248 State st., Albany, N. Y.	May	5, 1880
MACRITCHIE, CHARLES	171 La Salle st., Chicago, Ill. { A.	Oct.	2, 1872
MAIS, HENRY C.	Cons. Eng., 61 Queen st., Melbourne, Victoria, Australia.	April	5, 1876
MALLORY, GEORGE B.	55 Broadway, New York City	June	6, 1883
MAN, ALBON PLATT, JR.	Gen. Man. and Acting Ch. Eng. Silver Springs, Ocala & Gulf R. R., Ocala, Fla.	Sept.	3, 1884
MANLEY, HENRY	Asst. Eng. Engineering Dept., Boston, Mass.	Sept.	5, 1883
MANN, GEORGE E.	City Eng., City Hall, Buffalo, N. Y.	June	2, 1880
MANSFIELD, M. W.	Supt. Penna. Co., Indianapolis & Vincennes R. R., Indianapolis, Ind.	Sept.	3, 1884
MANSON, MARSDEN	Ch. Eng. Board of Harbor Com., 10 California st., San Francisco, Cal.	July	5, 1882
MARINDIN, HENRY L.	Ch. Eng. Board of Harbor Com., 10 California st., San Francisco, Cal.	Sept.	6, 1882
MARINDIN, HENRY L.	Asst. U. S. Coast and Geodetic Survey, Washington, D. C.	May	7, 1884
MARPLE, WILLIAM M.	Eng. Scranton Gas and Water Co., 304 Mifflin ave., Scranton, Pa.	June	4, 1890
MARR, GEORGE A.	U. S. Asst. Eng., in chg. Portage Lake and Lake Superior Ship Canal, Houghton, Mich.	June	4, 1890
MARSHALL, HORACE M.	Asst. Eng. in chg. Red River Survey, U. S. Engineer office, Vicksburg, Miss.	Oct.	3, 1883
MARSLAND, EDWARD	Sing Sing, N. Y.	Dec.	3, 1890
MARSTRAND, O. J.	Asst. Eng. Brooklyn Elev. R. R., 31 Sands st., Brooklyn, N. Y.	Feb.	6, 1878
MARTIN, CHARLES C.	Ch. Eng. and Supt. New York and Brooklyn Bridge, 179 Washington st., Brooklyn, N. Y.	May	7, 1890
MARVIN, CHARLES EZRA	Roadmaster Main Stem Central of Georgia Div. R. & D. R. R., Savannah, Ga. { J.	July	10, 1872
		July	1, 1885
		June	4, 1890

Name.	Address.	Date of Membership.	
MASON, ARTHUR J.	8th and K sts., Galveston, Texas.	Sept.	5, 1888
MASON, S. D.	Prin. Asst. Eng. Northern Pacific R. R., St. Paul, Minn.	Oct.	6, 1889
MASTEN, CORNELIUS S.	Vice-Pres. and Man. Maricopa & Phoenix R. R., Phoenix, Ariz.	Sept.	6, 1871
MAURICE, CHARLES S.	Union Bridge Co., Athens, Pa.	May	15, 1872
MAXIM, HIRAM S.	Man. Director Maxim Gun Co., Crayford, Kent, England.	Oct.	7, 1885
MAXSON, FRANK O.	Civil Eng., U. S. N., Navy Yard, Mare Island, Cal.	May	1, 1889
MAXWELL, DAVID F.	Ch. Eng. New Brunswick Govt. Rys., St. Stephen, N. B., Canada.	March	2, 1887
MAXWELL, JAMES R.	Newark, Delaware.	April	17, 1872
MAY, WILLIAM A.	Supt. Hillside Coal and Iron Co., Scranton, Pa.	July	6, 1881
MCCANN, THOMAS H.	N. H. Co. Ry. Bldg., Hoboken, N. J.	April	2, 1890
MCCCLINTOCK, WILLIAM E.	Civil Eng., 23 Court st., Boston, Mass.	Dec.	5, 1888
MCCCLINTOCK, WILLIAM H.	Supt. Columbus & Western Div. Central R. R. & Banking Co. of Georgia, Columbus, Ga.	April	5, 1876
MCCCLURE, ROBERT J.	(Care Chicago, Burlington & Quincy R. R.), Chicago, Ill.	Oct.	6, 1886
MCCCLURE, WILBUR F.	Ch. Eng. Los Angeles Terminal Ry., First and Myers sts., Los Angeles, Cal.	Nov.	3, 1886
MCCOLLOM, THOMAS C.	Civil Eng. U. S. N., 12 Newbury st., Boston, Mass.	May	3, 1882
MCCOMB, DAVID E.	Asst. Eng. District Government, Washington, D. C.	Feb.	7, 1877
MCCOOL, DANIEL	(Care of C. L. W. Eidlitz), 128 Broadway, New York City.	Sept.	5, 1884
MCDONALD, HARRY P.	(McDonald Bros. Architects), 5th and Market sts., Louisville, Ky.	March	5, 1884
MCDONALD, HUNTER	Res. Eng. Western & Atlantic R. R., Atlanta, Ga.	April	4, 1883
MCDONALD, JOHN A.	Eng. Road and Bridge Dept., Sydney, N. S. W., Australia.	March	7, 1888
MCDOWELL, NATHAN M.	Civil Eng., 4223 Fifth ave., Pittsburgh, Pa.	Feb.	5, 1890
MCGRATH, WALLACE	Nat. Military Home, Leavenworth, Kans.	April	4, 1877
McKEE, CHARLES HERNE	Asst. Eng. New York Central & Hudson River R. R., Buffalo, N. Y.	Sept.	5, 1883
		June	4, 1879



Name.	Address.	Date of Membership.
McKEE, SAMUEL B.	Eng. for Witherbee, Sherman & Co., Port Henry Iron Ore Co., L. C. & M. R. R., Mineville, N. Y.	June 2, 1886
McKENZIE, THEODORE H.	Secy. and Treas. Southington Water Co., Member State Board Civil Engs., Southington, Conn.	Sept. 7, 1881
McKEOWN, THOMAS	37 City Road, London, E. C., England.	Dec. 3, 1879
McLAIN, LOUIS R.	124 Bay st., Savannah, Ga.	Feb. 2, 1881
McMATH, ROBERT E.	(R. E. McMath & Sons, Cons. and Civil Engs.), 802 Odd Fellows' Bldg., St. Louis, Mo.	March 3, 1880
McMILLAN, CHARLES	Prof. of Civil Engineering, College of New Jersey, Princeton, N. J.	Jan. 29, 1868
McMINN, THOMAS J.	277 Pearl st., New York City.	March 5, 1890
McNAIR, THOMAS S.	Res. Eng. Lehigh Valley R. R., P. O. Box 591, Hazleton, Pa.	July 2, 1873
McNULTY, GEORGE W.	45 Broadway, New York City.	May 5, 1880
McVEAN, JOHN J.	Ch. Eng. Chicago & West Michigan Ry. and Detroit, Lansing & Northern R. R., Grand Rapids, Mich.	Sept. 3, 1884
MEIER, EDWARD D.	Pres. and Ch. Eng. Heine Safety Boiler Co., 707 Bank of Commerce Bldg., St. Louis, Mo.	Feb. 4, 1880
MEIGS, MONTGOMERY	U. S. Civil Eng., U. S. Engineer office, Keokuk, Ia.	March 5, 1879
MELVIN, DAVID N.	Linoleumville, Richmond Co., N. Y.	June 3, 1878
MENDELL, GEORGE H.	Col. Corps of Engs., Bvt. Col. U. S. A., P. O. Box 2426, San Francisco, Cal.	Sept. 6, 1876
MENOCAL, ANICETO G.	Civil Eng., U. S. N., Ch. Eng. Nicaragua Canal Cons. Co., Washington, D. C.	Feb. 3, 1875
MERIWETHER, NILES	City Eng., 14 Talbot st., Memphis, Tenn.	Nov. 1, 1871
MERRILL, GEORGE N.	285 Main st., Springfield, Mass.	May 1, 1889
MERRILL, WILLIAM E.	Lt.-Col. Corps of Eng., U. S. A., Custom House, Cincinnati, Ohio.	Oct. 6, 1872
MERRILL, WILLIAM F.	Gen. Man. Hannibal & St. Joseph R. R. and Kansas City, St. Joseph & Council Bluffs R. R., St. Joseph, Mo.	April 1, 1874

## MEMBERS.

63

Name.	Address.	Date of Membership.	
MERRIMAN, MANSFIELD	Prof. of Civil Engineering, { J. May 12, 1875 Lehigh University, Bethle- { M. Sept. 3, 1884 hem, Pa.		
MERSEREAU, CHARLES V.	Second Asst. Eng. St. Louis Water Works Extension, 77 East May st., St. Louis, Mo.	Dec.	3, 1884
METCALF, WILLIAM	Director Cresent Steel Co., 136 First ave., Pittsburgh, Pa.	July	2, 1874
MEYER, THOMAS C.	11 Waverley pl., New York City.	Dec.	7, 1852
MILLER, ALEXANDER M.	Maj. Corps of Eng., U. S. A., Cus- tom House, St. Louis, Mo.	June	6, 1888
MILLER, HARRY IRVING	Supt. Louisville Div. Penna. Lines West of Pittsburgh, Louisville, Ky.	May	2, 1888
MILLER, J. IMBRIE	(Care Am. Soc. C. E.), 127 East 23d st., New York City.	Oct.	5, 1887
MILLER, REUBEN	136 First av., Pittsburgh, Pa.	Sept.	1, 1875
MILLER, SILVANUS	Livingston, Guatemala, Central America, <i>via</i> New Orleans.	March	2, 1887
MILLS, ARTHUR L.	Ch. Eng. Toledo, St. Louis & Kan- sas City Ry., Toledo, Ohio.	May	2, 1888
MILLS, CHARLES M.	Pencoyd Bridge and Cons. { J. June 2, 1886 Co., Pencoyd, Pa. { M. Sept. 3, 1890		
MILLS, JAMES E.	Cons. Geologist and Mining Eng., Quincy, Plumas Co., Cal.	Feb.	3, 1886
MINTURN, ROWLAND R.	Div. Supt. C. M. & St. P. Ry., Babcock, Wis.	Nov.	2, 1887
MITCHELL, HENRY	Nantucket, Mass.	Jan.	7, 1880
MONTFORT, RICHARD	Ch. Eng. Louisville & Nashville R. R., Louisville, Ky.	June	6, 1888
MOORE, CHARLES E.	Santa Clara, Cal.	Jan.	7, 1880
MOORE, JAMES	Cons. Eng. Central R. R., of New Jersey, Elizabeth, N. J.	Dec.	4, 1867
MOORE, ROBERT	Ch. Eng. St. Louis Merchants' Bridge Terminal Ry., Laclede Bldg., St. Louis, Mo.	April	5, 1876
MORISON, GEORGE S.	1120 The Rookery, Chicago, Ill.	Jan.	6, 1875
MORRILL, GEORGE S.	Ch. Eng. Old Colony R. R., Boston, Mass.	March	2, 1887
MORRIS, CHARLES J. A.	Cons. Eng. and Gen. Contractor, 555 Drake Block (P. O. Box 2544), St. Paul, Minn.	Oct.	3, 1883
MORRIS, GOUVERNEUR	Johnson City, Tenn.	Oct.	3, 1888
MORRIS, HENRY G.	Eng. and Machinist, 926 Drexel Bldg., Philadelphia, Pa.	Dec.	4, 1867
MORRIS, MARSHALL	People's Bank, Louisville, Ky.	March	5, 1873

Name.	Address.	Date of Membership.	
MORRIS, ROBERT C.	Ch. Eng. Nashville, Chattanooga & St. Louis R. R., Nashville, Tenn.	Jan.	7, 1874
MORRIS, S. FISHER	Civil Engineer, Geneva, N. Y.	April	6, 1887
MORRIS, THOMAS O.	Asst. Ch. Eng. Cleveland, Chicago, Cincinnati and St. Louis Ry., Indianapolis, Ind.	Oct.	6, 1886
MORSE, BENJAMIN F.	Inspector of Bldgs., 11 City Hall, Cleveland, Ohio.	July	12, 1877
MORSE, CHARLES J.	Civil and Cons. Eng., 1107 The Rookery, Chicago, Ill.	Feb.	6, 1884
MORSE, HENRY G.	Pres. Edgemoor Bridge Works, 800 Delaware ave., Wilmington, Del.	April	7, 1880
MORSS, FOSTER	Eng. in chg. Washington Branch, N. & W. R. R., Front Royal, Va.	Nov.	6, 1872
MORTON, JOHN H.	Eng. in chg. D. & R. G. R. R., Room 118, Cheesman Block, Denver, Col.	June	3, 1891
MOSMAN, ALONZO T.	Asst. U. S. Coast and Geodetic Survey, Washington, D. C.	July	1, 1885
MOULTON, MACE	Man. and Eng. The R. E. Hawkins Iron Works, Springfield, Mass.	June	1, 1884
MOYLAN, JAMES	Civ. Eng., 330 Palisade ave., Jersey City, N. J.	Nov.	2, 1887
MÜNSTER, A.	City Engr's office, St. Paul, Minn.	May	1, 1889
MURDOCH, GILBERT	Eng. and Supt. Sewerage and Water Supply, St. John, New Brunswick.	Sept.	7, 1881
MYERS, CHARLES H.	Civil Eng., 63 Bleecker st., New York City.	Aug.	5, 1868
MYERS, E. T. D.	Richmond, Va.	May	2, 1888
NASH, CHARLES H.	Bloomfield, N. J.	Sept.	5, 1888
NEARING, FRANK	16 East Seneca st., Buffalo, N. Y.	June	5, 1889
NEILSON, CHARLES	Gen. Supt. Cincinnati, Hamilton & Dayton R. R., Cincinnati, Ohio.	Jan.	7, 1880
NEILSON, ROBERT	Gen. Supt. Northern Central Ry., and P. & E. Div. Penn. R. R., Williamsport, Pa.	Feb.	17, 1869
NELLES, GEORGE T.	Supt. Nebraska & Colo. Stone Co., Room 6, McClintock Block, Denver, Col.	Oct.	3, 1888
NEWELL, JOHN	Pres. and Gen. Man. Lake Shore & Michigan Southern Ry., 348 Ontario st., Chicago, Ill.	Jan.	29, 1868

Name.	Address.	Date of Membership.	
NEWHAM, CHARLES E.	Asst. Eng. in office of Commr. of Street Impvts., 23d and 24th Wards, 311 Willis ave., New York City.	Dec.	7, 1887
NEWMAN, ROBERT M.	415 West Franklin st., Jackson, Mich.	May	6, 1874
NEXSEN, ELBERT	1620 S. E. 4th st., Minneapolis, Minn.	Dec.	5, 1883
NICHOL, JOHN	171 La Salle st., Chicago, Ill. {	A. Oct.	2, 1872
		M. April	5, 1876
NICHOLS, OTHNIEL F.	Ch. Eng. Brooklyn Elevated R.R., 31 Sands st., Brooklyn, N. Y.	June	7, 1876
NICHOLS, NORMAN J.	Civil Eng. Honda, U. S. Colombia.	Dec.	5, 1888
NICHOLS, WILLARD A.	Civil Eng., Redlands, Cal.	May	7, 1873
NICHOLSON, GEORGE B.	Ch. Eng. Cincinnati, New Orleans & Texas Pacific Ry. and Associated roads, 530 Garrard st., Covington, Ky.	May	1, 1878
NICOLLS, WILLIAM J.	Pres. Irvona Coal Co., 216 South 3d st., Philadelphia, Pa.	June	5, 1878
NOBLE, ALFRED	2 Virginia ave., Memphis, Tenn. {	J. Sept.	2, 1874
		M. April	3, 1878
NORMAN, GEORGE H.	Newport, R. I.	Feb.	19, 1869
NORTH, EDWARD P.	(Director.) (Care Am. Soc. C. E.), 127 East 23d st., New York City.	Dec.	4, 1867
NORTHWAY, WILLIAM R.	Civil Eng., 806 Chamber of Commerce Bldg., Chicago, Ill.	July	3, 1889
NOURSE, EDWIN G.	Eng. Railroads, World's Columbian Exposition, 1143 The Rookery, Chicago, Ill.	Sept.	3, 1884
NOYES, ALBERT F.	City Engineer, Newton, Mass., West Newton, Mass.	Dec.	3, 1884
NOYES, ELLIS B.	Asst. Eng. in charge N. Y. State Canals, Stillwater, N. Y. {	J. July	7, 1880
		M. Oct.	2, 1889
OCKERSON, JOHN A.	U. S. Asst. Eng., Miss. River Comm., 2732 Pine st., St. Louis, Mo.	July	7, 1880
ODELL, FREDERICK S.	32 South 15th ave., Mt. Vernon, N. Y.	March	5, 1884
O'HANLY, JOHN L. P.	Ch. Eng. Ontario Pacific Ry., Ottawa, Ontario, Canada.	Sept.	5, 1883
OLNEY, GEORGE R.	Biltmore, N. C.	March	7, 1888
OLNEY, LAFAYETTE	Middletown, N. Y.	Oct.	7, 1868

Name.	Address.	Date of Membership.	
OPDYKE, STACY B., Jr.	(Benner and Opdyke, Engrs. and Contractors), 226 S. 4th st., Philadelphia, Pa.	Feb.	2, 1876
ORANGE, JAMES	Danby, Leigh & Orange, Hong Kong, China.	Dec.	3, 1890
ORBISON, THOMAS W.	Appleton, Wis.	Sept.	3, 1884
O'ROURKE, JOHN F.	Eng. of Dawson, Symmes & Ussher, Contractors, Chignecto Marine Transport Ry., Amherst, N. S.	April	2, 1884
OSBORN, FRANK C.	Ch. Eng. King Bridge Co., Cleveland, Ohio.	Oct.	3, 1888
OSGOOD, JOSEPH O.	Cons. Eng., 120 Broadway, New York City.	J. May	3, 1876
		M. March	5, 1879
OSTROM, JOHN N.	Bridge Eng., 45 Broadway, New York City.	Nov.	5, 1890
OWEN, FREDERICK N.	Sanitary Engineer, 58 West 91st st., New York City.	Sept.	7, 1887
OWEN, JAMES	721 Broad st., Newark, N. J.	Sept.	15, 1869
OWENS, HENRY K.	Ch. Eng. Northwest Eng. and Cons. Co., Seattle, Wash.	March	6, 1889
PACKARD, RALPH G.	Pres. and Gen. Man. Atlantic Dredging Co., 34 Pine st., New York City. (Residence, Morristown, N. J.)	Feb.	17, 1869
PAINE, ARTHUR B.	Windsor Hotel, New York City.	Sept.	6, 1882
PAINE, CHARLES	(Past-President.) Cons. Eng., 71 Broadway, New York City.	Dec.	4, 1867
PALMER, CORNELIUS	Eng. Peninsula Div. Chicago & Northwestern Ry., Escanaba, Mich.	Nov.	2, 1887
PARENT, ETIENNE HENRI	Supt. Eng. of Canals, Montreal Div. (P. O. Box 2031), Montreal, Canada.	Sept.	7, 1881
PARET, MILNOR P.	U. S. Asst. Eng., Fernandina, Fla.	Sept.	2, 1885
PARKER, ANDREW MCC.	Asst. Eng. Dept. Docks, foot East 16th st., New York City.	March	6, 1889
PARKER, C. O.	(Parker & Cross, Civil Engs.), 310 Richardson Bldg., Chattanooga, Tenn.	Oct.	2, 1889
PARKER, MAURICE S.	Eng. Great Falls W. P. & T. Co., Great Falls, Mont.	Feb.	5, 1890
PARKHURST, HENRY W.	(Care E. L. Corthell), 205 La Salle st., Chicago, Ill.	Sept.	5, 1877
PARSONS, HENRY C.	State Engineer's Office, 49 First st., Albany, N. Y.	Oct.	6, 1886



Name.	Address.	Date of Membership.	
PARSONS, WM. BARCLAY	Cons. Engineer, 35 Broad-way, New York City.	J. June 7, 1882	M. Nov. 2, 1887
PARTRIDGE, JOHN A.	511 6th st., N. W., Washington, D. C.	Sept. 6, 1882	
PATTEN, HENRY B.	Div. Eng., Wyoming Div. Union Pacific R. R., 208 West 22d st., Cheyenne, Wyo.	Jan. 4, 1888	
PATTERSON, JOHN CURTIS	Asst. Ch. Engineer Central New England & Western R. R., Poughkeepsie, N. Y.	Oct. 2, 1889	
PEARL, JAMES W.	Eng. and Contractor Bridges and Bldgs., Benton Harbor, Mich.	Jan. 2, 1889	
PEARSONS, GALEN W.	Kansas City, Mo.	Jan. 6, 1875	
PEARY, ROBERT E.	Civil Eng., U. S. N., U. S. Navy Yard, League Island, Pa.	March 3, 1886	
PEGRAM, GEORGE H.	Cons. Eng., 3625 Finneyave., St. Louis, Mo.	J. April 7, 1880	M. Jan. 3, 1883
PERKINS, CHARLES P.	Real Estate Department, Penn. R. R., 233 South 4th st., Philadelphia. Pa.	J. Feb. 3, 1875	M. April 5, 1882
PETERSON, P. ALEX.	Ch. Eng. Canadian Pacific R., Montreal, Canada.	Jan. 5, 1876	
PETRY, ALFRED	1516 North 16th st., Philadelphia, Pa.	Oct. 6, 1886	
PETTIT, ROBERT E.	Altoona, Pa.	Nov. 1, 1876	
*PEW, ARTHUR	Talbotton, Ga.	Dec. 2, 1885	
PICKETT, WILLIAM D.	Mee-tee-tse, Wyoming.	July 6, 1853	
PIHL, OLAF R.	Eng. Oregon Bridge Co., Portland, Ore.	Oct. 2, 1889	
PIERSON, GEORGE S.	Civil and San. Eng., Kalamazoo, Mich.	June 5, 1889	
PIKE, WILLIAM A.	University of Minnesota, Minneapolis, Minn.	Dec. 3, 1890	
PLAYLE, EDWARD F.	Civil Eng. and Contractor, 49 Rush st., Chicago, Ill.	Nov. 2, 1887	
PLYMPTON, GEORGE W.	Prof. Physical Science and Engineering, Director Cooper Union Night School, 127 Herkimer st., Brooklyn, N. Y.	Jan. 29, 1868	
POE, ORLANDO M.	Col. Corps of Engs., Bvt. Brig.-Gen. U. S. A., 34 West Congress st., Detroit, Mich.	Jan. 8, 1873	
POETSCH, CHARLES J.	Asst. City Eng., Court House, Milwaukee, Wis.	J. May 4, 1881	M. May 2, 1883
POPE, WILLARD S.	Pres. Detroit Bridge and Iron Works, Detroit, Mich.	Aug. 7, 1872	

\* Formerly spelled Pou.

Name.	Address.	Date of Membership.
PORTER, ALBERT H.	King Iron Bridge and Mfg. Co., Cleveland, Ohio.	March 6, 1889
POST, ANDREW J.	(Post & McCord, Engs. and Con- tractors), 102 Broadway, New York City.	Nov. 1, 1871
POST, JAMES C.	Maj. Corps of Engs. U. S. A. (Care U. S. Legation), London, Eng- land.	Feb. 6, 1878
POST, LEVI W.	(Care Post & McCord), 102 Broad- way, New York City.	March 5, 1873
POTT, JOHN N.	Pottsville, Pa.	April 3, 1889
POTTER, HENRY W.	Apartado 198, Mexico, Mexico.	Dec. 5, 1888
POITS, JOSEPH D.	Pres. Enterprise Transit Co., 234 South 4th st., Philadelphia, Pa.	Aug. 5, 1868
POWELL, CHARLES F.	Capt. Corps of Engs., U. S. A., Eng. in chg. Improving Missouri River, from Sioux City to foot of the Great Falls, Sioux City, Iowa.	Oct. 3, 1888
POWERS, JOSEPH A.	Lansingburgh, N. Y.	{ J. April 2, 1884 { M. Sept. 3, 1890
PRATT, WILLIAM A.	Div. Eng. Maintenance Way, Bal- timore & Ohio R. R., 2400 Chest- nut st., Philadelphia, Pa.	July 5, 1882
PRENDERGAST, FRANCIS E.	Agricultural Supt. San Diego Land and Town Co., National City, Cal.	March 7, 1888
PRENTISS, F. H.	Gen. Man. and Eng. New York Steam Co., 2 Cortland st., New York City.	July 2, 1890
PREVOST, SUTHERLAND M.	Gen. Supt. Transportation Penn. R. R., 233 South 4th st., Phila- delphia, Pa.	Jan. 6, 1875
PRICE, PHILIP M.	Capt. Corps Engs., U. S. A., Mont- gomery, Ala.	May 2, 1888
PRINCE, EDWARD	Quincy, Ill.	{ J. Feb. 6, 1878 { M. Nov. 1, 1882
PRINDLE, FRANKLIN C.	Civ. Eng., U. S. N., U. S. Navy Yard, Boston, Mass.	March 4, 1874
PRIOR, CHARLES H.	Civil Eng., 516 New York Life Bldg., Minneapolis, Minn.	March 1, 1882
PROBASCO, SAMUEL R.	179 Washington st., Brooklyn, N. Y.	Nov. 18, 1868
PROUT, HENRY G.	Mang. Editor <i>Railroad</i> <i>Gazette</i> , 73 Broadway, New York City.	{ A. Nov. 6, 1872 { M. Sept. 3, 1879
PURDON, CHARLES D.	Bridge Eng. Atchison, Topeka & Santa Fé R. R., Topeka. Kans.	March 3, 1886

Name.	Address.	Date of Membership.	
QUIMBY, HENRY H.	Asst. Eng. The Phoenix Bridge Co., Phoenixville, Pa.	Sept.	3, 1890
QUINTUS, JOHN CHARLES	U. S. Inspector, U. S. Engineer Office, Erie, Pa.	Jan.	2, 1889
RADENHURST, WILLIAM N.	Asst. Eng. Rochester Water, { Rochester, N. Y.	J. July 7, 1875 M. July 7, 1880	
RAFTER, GEORGE W.	Rochester, N. Y.	April	2, 1884
RAMSEY, JOSEPH, Jr.	Asst. to Pres. C., C. C. & St. L. Ry., Cincinnati, O.	May	1, 1889
RANDOLPH, BEVERLY S.	Mining Supt. Consolidation Coal Co., Frostburg, Md.	May	2, 1888
RANDOLPH, L. S.	Eng. Tests B. & O. R. R., Mt. Clare, Baltimore, Md.	Jan.	2, 1889
RAY, NATHANIEL C.	Butte City, Mont.	July	5, 1882
RAYMOND, CHARLES WARD	Gen. Man. Merrimac Consd. Mining Co., Platoro, Cone- jos Co., Colo.	J. Nov. 7, 1877 M. April 7, 1886	
REA, SAMUEL	(Care Rea Bros. & Co.), Box 198, Pittsburgh, Pa.	June	4, 1884
READ, ROBERT L.	Civil Eng., 49 West 3d st., Cincinnati, O.	Sept.	2, 1874
REECE, BENJAMIN	311 Phenix Bldg., Chicago, Ill.	March	2, 1881
REED, EDWARD M.	Vice-Pres. New York, New Haven & Hartford R. R., New Haven, Conn.	July	10, 1872
REED, HENRY WADSWORTH	Mast. of Roadway, Savannah, Florida & Western Ry., Waycross, Ga.	Jan.	6, 1886
REED, HORATIO G. H.	Cons. Eng. Milwaukee, Lake Shore & Western R. R., Oshkosh, Wis.	Oct.	7, 1874
REED, SAMUEL B.	Civil Eng., Joliet, Ill.	Oct.	20, 1869
REEVES, DAVID	Pres. The Phoenix Iron Co., 410 Walnut st., Phila- delphia, Pa.	J. April 1, 1874 M. May 3, 1882	
RHODES, BENJAMIN	Pres. Brush Electric Light and Power Co., Niagara Falls, N. Y.	April	5, 1882
RICE, EDWARD C.	3649 Pine st., St. Louis, Mo.	April	7, 1875
RICE, GEORGE S.	Ch. Eng. Rapid Transit Comm., Room 306 Exchange Bldg., Boston, Mass.	Feb.	1, 1882
RICE, LEWIS FREDERICK	Asst. Eng. Am. Bell Telephone Co., 125 Milk st., Boston, Mass.	Jan.	2, 1889
RICE, WALTER P.	Civil Eng., Cleveland, Ohio.	March	6, 1889
RICH, WATSON W.	Ch. Eng., Minneapolis, St. Paul & Sault Ste. Marie Ry., Minneapolis, Minn.	Sept.	5, 1883

Name.	Address.	Date of Membership.	
RICHARDS, H. TUDOR	Asst. Gen. Man. Sonoro R. R., Guaymas, Sonoro, Mexico.	Oct.	6, 1886
RICHARDSON, B. FRANK	Asst. Eng. Baltimore & Ohio R. R., 2030 Federal st., Philadelphia, Pa.	July	1, 1885
RICHARDSON, HENRY B.	Ch. State Eng., New Orleans, La.	May	7, 1879
RICHARDSON, THOMAS F.	Ch. Eng. Manitou & Pikes Peak R. R., Manitou, Colo.	Nov.	4, 1885
RICKETTS, PALMER C.	Wm. Howard Hart Prof. Ra- tional and Technical Me- chanics, Rensselaer Pol. Inst., Troy, N. Y.	{ A. Feb. 4, 1886 M. Oct. 5, 1887	
RICKON, FRED J. H.	City Eng., Little Rock, Ark.		
RIFFLE, ALBERT S.	Sec. and Treas. Oregon Bridge Co., Ainsworth Block, Portland, Ore.	Jan.	4, 1888
RIFFLE, FRANKLIN	Pres. Oregon Bridge Co., Ains- worth Block, Room 21, Portland, Ore.	May	7, 1890
RINECKER, FRANCIS	Civil Eng., Wuerzburg, Germany.	Nov.	7, 1888
RIITCHIE, JAMES	Civil Eng., 454 The Arcade, Cleve- land, Ohio.	Aug.	7, 1872
RIVES, ALFRED L.	Civil Eng., 454 The Arcade, Cleve- land, Ohio.	Nov.	5, 1890
RIVES, ALFRED L.	Gen. Supt. Panama R. R., Mills Bldg., New York City.	Sept.	4, 1872
ROBERTS, EVELYN P.	Asst. Eng. Aqueduct Commission (Box 527), Sing Sing, N. Y.	May	7, 1884
ROBERTS, PERCIVAL, Jr.	261 South 4th st., Philadel- phia, Pa.	May	7, 1879
ROBINSON, ALBERT A.	Second Vice-Pres. and Gen. Man. A. T. & S. F. R. R., Topeka, Kansas.	June	4, 1884
ROBINSON, ALBERT F.	(Care Purdy & Phillips), 1119 The Rookery, Chicago, Ill.	May	5, 1880
ROBINSON, GEORGE H.	Eng. and Asst. Gen. Man. The Montana Co. (Ltd.), Marysville, Mont.	Nov.	2, 1887
ROBINSON, STILLMAN W.	Prof. of Mech. Eng. Ohio State University, 1353 Highland st., Columbus, Ohio.	March	7, 1888
ROCKWELL, SAMUEL	Room 10, Davidson Block, St. Paul, Minn.	Jan.	2, 1884
RODD, THOMAS	Ch. Eng. Penn. Co., Pittsburgh, Pa.	Jan.	7, 1880
ROGERS, FAIRMAN	Civil Eng., 134 South 4th st., Philadelphia, Pa.	Jan.	5, 1878
ROGERS, MERRITT H.	Civil Eng., 134 South 4th st., Philadelphia, Pa.	May	7, 1873
ROGERS, MERRITT H.	Ch. Eng. D. & R. G. R. R., Denver, Colo.	Jan.	2, 1890

Name.	Address.	Date of Membership.	
ROOD, HENRY M.	Covert, Mich.	Dec.	3, 1890
ROSE, CHARLES C.	Div. Eng. Delaware, Lackawanna & Western R. R., Scranton, Pa.	April	4, 1888
ROSECRANS, WILLIAM S.	Bvt. Maj. Gen., U. S. A., Washington, D. C.	July	5, 1882
ROSEWATER, ANDREW	424 Bee Bldg., Omaha, Neb.	Oct.	3, 1883
ROSS, JAMES	Windsor Hotel, Montreal, Canada.	Sept.	6, 1882
ROTCH, WILLIAM	Pres. Consolidated Electric Mfg. Co., 8 Exchange pl., Boston, Mass.	March	5, 1873
ROTHWELL, RICHARD P.	Civil and Mining Eng., Editor <i>Engineering and Mining Journal</i> , 27 Park pl., New York City.	Jan.	29, 1868
ROWE, R. D.	Res. Eng. A. T. & S. F. R. R. (Box 153), E. Las Vegas, N. M.	Jan.	2, 1890
ROWE, SAMUEL M.	324 Willow ave., Topeka, Kan.	Sept.	2, 1885
ROWLAND, CHARLES L.	Propr. Morton Iron Works (Residence 61 Morton st.), Brooklyn, N. Y.	Sept.	1, 1886
ROWLAND, THOMAS F.	Pres. The Continental Iron Works, Brooklyn, N. Y. (Residence, 329 Madison ave., New York City).	Dec.	4, 1867
ROWLAND, THOMAS F., Jr.	Sec. and Treas. The Continental Iron Works (P. O. Station G), Brooklyn, N. Y.	Sept.	1, 1886
RUDLOFF, HENRY F.	Ch. First Sec. Gram. Ferro Carril de Venezuela, Caracas, Venezuela.	Jan.	6, 1886
RUGGLES, WILLIAM B.	Ch. Eng. C. P. & O. R. R., United Bank Bldg., Cincinnati, Ohio.	April	7, 1886
RUMBLE, WILLIAM	20 W. 38th St., Bayonne, N. J.	Sept.	1, 1886
RUNDLETT, LEONARD W.	City Eng., St. Paul, Minn.	Sept.	5, 1883
RUSLING, GEORGE M.	Civil Eng. and Contractor, Hackettstown, N. J.	Nov.	1, 1882
RUSSELL, S. BENT	Asst. Eng. in chg. Water Works Extension, 77 East May st., St. Louis, Mo.	<div style="display: inline-block; vertical-align: middle;"> <div style="display: inline-block; vertical-align: middle;">J.</div> <div style="display: inline-block; vertical-align: middle;">M.</div> </div>	June 4, 1884
			June 1, 1887
RUSSELL, NATHANIEL E.	580 1st ave., Lansingburgh, N. Y.	Oct.	3, 1889
RUTHERFURD, FRANCIS M.	Asst. Eng. Maint. Way Richmond & Danville R. R., Richmond, Va.	Oct.	6, 1886
SAABYE, OSCAR	Cons. Eng., 108 Jefferson st., Roanoke, Va.	Oct.	1, 1890
SAFFORD, EDWARD S.	Sharon, Mass.	Dec.	6, 1882
SAMPLE, JOHN H.	Ch. Eng. Pittsburgh, Akron & Western R. R., Akron, Ohio.	Oct.	6, 1886



Name.	Address.	Date of Membership.	
SANDERSON, J. GARDNER	Civil Eng., Scranton, Pa.	July	6, 1881
SAUNDERS, WILLIAM L.	Secy. and Eng. Ingersoll-Sergeant Drill Co., 10 Park pl., New York City.	Nov.	3, 1886
SAVAGE, ALBERT C.	61 Broadway, New York City.	May	4, 1881
SAWYER, CHARLES H.	Cashier, The Bank of Scottsville, Scottsville, Kan.	June	2, 1886
SCAIFE, WM. LUCIEN	Chairman Scaife Foundry and Mach. Co. (Ltd.), Pittsburgh, Pa.	Dec.	3, 1890
SCHAEFFER, JOHN S.	Cons. Civil Eng., 191 Littleton ave., Newark, N. J.	June	2, 1886
SCHAUB, JULIUS W.	Eng. Detroit Bridge & Iron Works, Detroit, Mich.	Nov.	5, 1884
SCHENCK, ARCHIBALD A.	Ch. Asst. Eng. N. Y. C. & H. R. R., West Shore R. R., Grand Central Station, New York City.	Oct.	6, 1886
SCHERZER, ALBERT J.	(Care W. H. Harned), 330 Drexel Bldg., Philadelphia, Pa.	Oct.	1, 1890
SCHERZER, WILLIAM	Asst. Eng. Keystone Bridge Co., 509 Home Insurance Bldg., Chicago, Ill.	Jan.	6, 1886
SCHMIDT, MAX E.	Ch. Eng. and Gen. Man. Multiple Speed and Traction Co., 54 Lakeside Bldg., Chicago, Ill.	Sept.	5, 1888
SCHNEIDER, CHARLES C.	Ch. Eng. Pencoyd Bridge and Construction Co., 261 South 4th st., Philadelphia, Pa.	May	7, 1879
SCHUYLER, JAMES D.	Cons. Eng., 36 Lawyers Block, San Diego, Cal.	Feb.	6, 1884
SCOTT, ADDISON M.	Res. Eng. U. S. Imp. Gt. Kanawha River, Charleston, West Va.	Dec.	6, 1882
SCOTT, ARTHUR H.	67 and 68 Moffat Block, Detroit, Mich.	June	2, 1886
SCOTT, CHALMERS	Allyn Block, Rooms 4—7, San Diego, Cal.	May	2, 1883
SCOTT, CHARLES A.	Eng. and Contractor, Contr. Lower Laurentian Ry., Quebec, Canada.	July	2, 1890
SCOVILL, E. TRACY	Civil Eng. (Care Union Club), Cleveland, Ohio.	Nov.	5, 1884
SEAMAN, HENRY B.	10 West 29th st., New York City.	Sept.	6, 1876
SEARLES, WILLIAM H.	Cons. Civil Eng., Port Henry, N. Y.	June	2, 1886
SEARS, ALFRED FRANCIS	Portland, Ore.	Dec.	7, 1887
SEDGWICK, THOMAS S.	Ch. Eng. Board Harbor Commrs., San Diego, Cal.	July	2, 1873
		June	2, 1869
		July	20, 1870

Name.	Address.	Date of Membership.
SELLERS, COLEMAN	Cons. Eng., Prof. Eng. Practice, Stevens Institute, Hoboken, N. J. (Address: 3301 Baring st., Philadelphia, Pa.)	May 3, 1876
SELLERS, WILLIAM	1819 Vine st., Philadelphia, Pa.	May 3, 1876
SENGOKU, MITSUGU	Railway Dept., Tokio, Japan.	June 4, 1890
SEWALL, JOSEPH S.	44 Gilfillan Block, St. Paul, Minn.	July 7, 1875
SEYMOUR, CHARLES	Madisonville, Hopkins Co., Ky.	Sept. 6, 1871
SEYMOUR, HORATIO	Man. Director Michigan Land and Iron Co. (Limited), { A. Marquette, Mich. { M.	Jan. 3, 1873 April 7, 1880
SHAILER, ROBERT A.	(Shailer & Schniglaui, Engs. and Contractors), 609—611 Phenix Bldg., Chicago, Ill.	March 3, 1880
SHANKLAND, E. C.	Eng. of Cons. to Burnham & Root, Architects, 1142 The Rookery, Chicago, Ill.	Feb. 5, 1890
SHANKS, THOMAS P.	Min. Eng. Am. Bituminous Rock Co., 237 Jacob st., Louisville, Ky.	May 2, 1888
SHANLY, JAMES MOORE	Ch. Eng. Montreal & Ottawa Ry., 40 St. Mark st., Montreal, Canada.	July 6, 1887
SHAW, GRANVILLE W.	U. S. Asst. Eng. Ohio Falls River Impvt., Box 124, Louisville, Ky.	Oct. 5, 1887
SHEARER, SAMUEL H.	Man. Western Paving and Supply Co., 33 Ingalls Block, Indiana- polis, Ind.	Jan. 5, 1887
SHEDD, J. HERBERT	City Eng., City Hall, Providence, R. I.	Sept. 15, 1869
SHEPARD, DAVID C.	St. Paul, Minn.	May 2, 1883
SHERMAN, RICHARD W.	36 Broad St., Utica, N. Y.	Oct. 6, 1887
SHINN, WILLIAM P.	(Past President.) Room 701, Bank of Commerce Bldg. (P. O. Box 356), Pittsburgh, Pa.	Sept. 15, 1869
SHIRREFFS, REUBEN	150 Ellison st., Paterson, N. J.	June 4, 1890
SICARD, MIRITILIANO	Ibague, Tolimo, U. S. Colombia.	Jan. 4, 1882
SICKELS, FREDERICK E.	Ch. Eng. National Water Works Co., Kansas City, Mo.	Jan. 7, 1891
SIMPSON, ALFRED H.	Civil Eng., 35 Broadway, New York City.	Sept. 7, 1887
SIMPSON, GEORGE F.	(Care Am. Soc. C. E.), 127 East 23d st., New York City.	March 2, 1887
SIMPSON, GEORGE H.	Terre Haute, Ind.	Oct. 6, 1880
SKILTON, GEORGE S.	372 Decatur st., Brooklyn, N. Y.	Sept. 7, 1881
SKINNER, FRANK W.	Editorial Staff <i>The Engineering Record</i> , 277 Pearl st., New York City.	Sept. 1, 1886

Name.	Address.	Date of Membership.
SLATAPER, FELICIAN	Cons. Eng. Pennsylvania Co., Pittsburgh, Pa.	Sept. 15, 1869
SLOAN, ROBERT I.	Ch. Eng. Chicago & South Side Elev. Ry., 627 The Rookery, Chicago, Ill.	Oct. 1, 1884
SMEDLEY, SAMUEL L.	Ch. Eng. and Surveyor, Dept. Public Works, Room 418, City Hall, Philadelphia, Pa.	Sept. 2, 1874
SMITH, ALBERT M.	Supt. 18th Street Station, Consolidated Gas Co., 18th st. and Tenth ave., New York City.	May 5, 1886
SMITH, B. BURGH	U. S. Asst. Light House Eng., 5 Southern Wharf, Charleston, S. C.	Nov. 7, 1888
SMITH, D. LOWBER	62 West 83d st., New York City.	May 4, 1887
SMITH, FREDERICK H.	Civil and Cons. Engineer and Bridge Builder, 227 East German st., Baltimore, Md.	Feb. 21, 1872
SMITH, GEORGE C.	(Care E. J. Blake, Ch. Eng. C. B. & Q. Ry.), Chicago, Ill.	Dec. 3, 1890
SMITH, HAMILTON, Jr.	30 St. Swithin's lane, London, E. C., England.	Feb. 5, 1879
SMITH, ISAAC A.	Ch. Eng. St. Louis Transfer Ry., East St. Louis Con. Ry., Wiggins Ferry Co., Room 31, Rep. Bldg., St. Louis, Mo.	Oct. 3, 1888
SMITH, ISAAC W.	Supt. City Water Works, Portland, Oregon.	Oct. 1, 1873
SMITH, JARED A.	Lieut.-Col. Corps Engs., U. S. A., Portland, Me.	May 2, 1883
SMITH, JOSEPH SHUTER	Manheim st., Germantown, Philadelphia, Pa.	April 1, 1874
SMITH, LUCIUS A.	The Continental Iron Works, Brooklyn, N. Y.	May 7, 1873
SMITH, MILLER A.	224 Keep st., Brooklyn, N. Y.	Oct. 6, 1886
SMITH, OBERLIN	Pres. Ferracute Machine Co., Bridgeton, N. J.	Sept. 3, 1884
SMITH, T. GUILFORD	Chapin Block, Buffalo, N. Y.	Sept. 6, 1871
SMITH, S. HARRISON	318 Pine st., San Francisco, Cal.	July 3, 1889
SMITH, W. HARRISON	Eng. Carnegie Bros. & Co. (Ltd.), 48 Fifth ave., Pittsburgh, Pa.	July 5, 1882
SMITH, WILLIAM SOOY	Civil Eng., 652 The Rookery, Chicago, Ill.	Jan. 17, 1872
SNOW, J. PARKER	Bridge Eng., Boston & Maine R. R., Boston, Mass.	June 3, 1885
SOMERVILLE, ROBERT	Asst. Eng. Board Mississippi Levee Com., Greenville, Miss.	June 1, 1887

Name.	Address.	Date of Membership.	
SONNE, OTTO F.	(Care S. Haagemen), U. S. Engineer Office, Box 5346, Boston, Mass.	Sept	7, 1887
SOOYSMITH, CHARLES	(Pres. SooySmith & Co., Cons. and Contracting Engs.), 2 Nassau st., New York City.	May	5, 1886
SORZANO, JULIO F.	Cons. Civil Eng., 33 Broadway, New York City.	Sept.	3, 1884
SOSA, PEDRO J.	Panama, U. S. Colombia.	Dec.	3, 1884
SOULE, HOWARD	Syracuse, N. Y.	March	17, 1869
SPENCER, SAMUEL	23 Wall st., New York City.	Sept.	2, 1885
SPOULE, WILLIAM J.	Prin. Asst. Eng. Harbor Trust, Montreal, Canada.	Sept.	1, 1886
STAATS, JOHN H.	(R. P. & J. H. Staats, Contractors), 29 Broadway, New York City.	March	5, 1884
STAATS, ROBERT P.	(R. P. & J. H. Staats, Contractors), 29 Broadway, New York City.	{ J. Nov. 3, 1875 M. July 1, 1885	
STALEY, CADY	Pres. Case School Applied Science, Cleveland, Ohio,		
STANIFORD, CHARLES W.	Asst. Surveyor, Dept. of Docks, Pier A, North River, New York City.	May	7, 1890
STANTON, ROBERT B.	Coronado, Cal.	Sept.	1, 1880
STARLING, WILLIAM	Ch. Eng. Mississippi Levee District, Greenville, Miss.	Sept.	7, 1887
STARR, ARTHUR B.	Supt. E. Div. P. R. R., Allegheny, Pa.	June	5, 1889
STAUFFER, DAVID McNEELY	Editor <i>Engineering News</i> , Tribune Bldg., New York City.	Sept.	2, 1874
STEARNS, FREDERIC P.	Ch. Eng. State Board of Health, 13 Beacon st., Boston, Mass.	Oct.	2, 1878
STEARNS, IRVING A.	Man. Coal Companies of Pennsylvania R. R. Co., Wilkesbarre, Pa.	April	2, 1884
STEPHENS, CLINTON F.	1502 Washington ave., St. Louis, Mo.	Sept.	5, 1877
STEVENS, FRANK S.	Div. Eng. Main Line, Philadelphia & Reading R. R., Reading, Pa.	Oct.	3, 1883
STEVENS, HORACE E.	Eng. and Contractor, P. O. Box 2396, St. Paul, Minn.	{ J. Nov. 1, 1866 M. April 4, 1888	
STEVENS, JOHN F.	Lock Box 345, Snohomish, Wash.		
STEWART, JOHN M.	322 West 58th st., New York City.	{ J. March 2, 1887 M. Jan. 4, 1888	
STIXRUD, MARTINIUS	Civil and Hydr. Eng., Burke Bldg., Seattle, Wash.		
STONE, EDWARD H.	In chg. Construction Section, office Director General of Railways, Simla, India.	Dec.	5, 1888

Name.	Address.	Date of Membership.
STOREY, WILLIAM B., Jr.	Cor. 4th and Townsend sts., San Francisco, Cal.	Jan. 2, 1889
STOWELL, CHARLES F.	Civil Eng., Bridge Eng. N. Y. State Board R. R. Commrs., 43 Maiden lane, Room 1, Albany, N. Y.	April 4, 1888
STRIEDINGER, JULIUS H.	Supt. Independence Gold and Silver Mining Co., Tombstone, Ariz.	Feb. 2, 1876
STROBEL, CHARLES L.	Ch. Eng. Keystone Bridge Co., Cons. Eng. Carnegie Associations, 205 La Salle st., Chicago, Ill.	Dec. 3, 1879
STRONG, CHARLES H.	Civil Eng. and Contractor, 1789 Euclid ave., Cleveland, Ohio.	Jan. 8, 1873
STUBBS, LINTON W.	Res. Eng. Vicksburg, Shreveport & Pacific and Alabama & Vicksburg R. Rs., Vicksburg, Miss.	Oct. 3, 1888
SURTEES, ROBERT	Man. Water Works, Ottawa, Canada.	April 5, 1882
SWAN, CHARLES H.	93 Lincoln st., Boston, Mass.	March 16, 1870
SWEET, ELNATHAN	13 Tenbroeck st., Albany, N. Y.	Nov. 6, 1878
SWEET, WILLIAM A.	Pres. Sweet Mfg. Co., Syracuse, N. Y.	Feb. 2, 1876
SWIFT, ALEXANDER J.	Ch. Eng., N. R. R. Dept. Delaware and Hudson Canal Co., Albany, N. Y.	Feb. 1, 1888
SYMINGTON, WILLIAM N.	Vice-Pres. St. Louis Smelting and Ref. Co., 421 Olive st., St. Louis, Mo.	May 4, 1881
TALBOT, ARTHUR N.	Prof. Municipal Eng., University of Illinois, Champaign, Ill.	April 4, 1888
TALCOTT, COOK	136 Liberty st., Room 514, New York City.	April 15, 1868
TALCOTT, E. N. KIRK	Civil Eng., Florida, Orange Co., N. Y.	Jan. 29, 1868
TALCOTT, THOMAS M. R.	Cons. Eng. (Talcott & Whitcomb, Civil Engrs.), P. O. Box 109, Richmond, Va.	Sept. 1, 1886
TAYLOR, BUSHROD W.	208 East Gray st., Louisville, Ky.	Sept. 4, 1889
TAYLOR, EDWARD B.	Gen. Supt. Trans., Penna. Lines, West of Pittsburgh, Pittsburgh, Pa.	Sept. 3, 1884
TAYLOR, NORTON L.	513 California Bldg., Tacoma, Wash.	Feb. 4, 1891
TEMPLE, ROBERT H.	Ch. Eng. G. C. & N. Ry., Athens, Ga.	May 6, 1885
THACHER, EDWIN	Bridge Eng. and Contractor, 258 West Main st., Louisville, Ky.	Feb. 17, 1869



## MEMBERS.

77

Name.	Address.	Date of Membership.
THACKRAY, GEORGE E.	Office Ch. Eng. Cambria Iron Co., Johnstown, Pa.	J. Sept. 6, 1882 M. April 7, 1886
THAYER, RUSSELL	Ch. Eng. and Supt. Fairmont Park, Cons. Eng., City Hall, Philadelphia, Pa.	Dec. 6, 1882
THOMAS, BENJAMIN F.	U. S. Asst. Eng., Louisa, Ky.	April 6, 1887
THOMAS, JOSEPH R.	Cons. Eng., 138 East 79th st., New York City.	Oct. 5, 1881
THOMPSON, BENJAMIN	Richardson Block, Room 65, Chattanooga, Tenn.	July 3, 1889
THOMPSON, GAYLORD	340 Hudson st., Hoboken, N. J.	April 2, 1890
THOMPSON, SAMUEL C.	Asst. Eng. Dept. Public Parks, 2775 Third ave. (Residence, 832 East 161st st.), New York City.	Feb. 6, 1889
THOMPSON, WILLIAM G. M.	Res. Eng. Sault Ste. Marie Canal, Sault Ste. Marie, Ontario, Canada.	July 2, 1879
THOMSON, GEORGE H.	Eng. Bridges New York Central & Hudson R. R. R.; Cons. Eng. Adirondack & St. Lawrence R. R., Room 48, Grand Central Station, New York City.	Feb. 2, 1887
THOMSON, JOHN	Mech. Eng., 212 Temple Court Bldg., New York City.	March 2, 1887
THORNDIKE, JOHN L.	Lima, Peru (Care of J. S. Spinney, 66½ Pine st., New York City).	May 7, 1873
THURSTON, ROBERT H.	Director of Sibley College, Prof. Mech. Engineering, Cornell Univ., Ithaca, N. Y.	Dec. 6, 1871
TIDD, MARSHALL M.	Civil Eng., 10 Tremont st., Boston, Mass.	Oct. 2, 1878
TINGLEY, GEORGE C.	Eng. Union R. R., 21 South Main st., Providence, R. I.	Sept. 6, 1871
TINTORER Y GIBERGA, JOSÉ	Asalto No. 12, Barcelona, Spain.	May 5, 1880
TITLOW, J. MILTON	Cons. Civil Eng., Norristown, Pa.	Aug. 6, 1879
TOBIAS, J. M.	Cartagena, U. S. Colombia.	Sept. 3, 1890
TODD, FRANK H.	City Eng., St. Cloud, Minn.	Feb. 6, 1889
TOMLINSON, ALFRED T.	(Care Wm. J. Bogart, Gen. Agent C. & A. R. R.), 261 Broadway, New York City.	Sept. 7, 1887
TOMPKINS, JOHN A. B.	Div. Eng. Gt. Northern Ry. Line, Kalispell, Mont.	Dec. 4, 1889
TOMPSON, GEORGE M.	Div. Eng. Maint. Way Western Gen. Div. N. & W. R. R., Roanoke, Va.	May 2, 1888
TOWLE, STEVENSON	Cons. Eng. Dept. Public Works, 31 Chambers st., New York City.	Feb. 19, 1868.

Name.	Address.	Date of Membership.
TOWNE, HENRY R.	President Yale & Towne Mfg. Co., Stamford, Conn.	Oct. 3, 1883
TRUESDELL, CHARLES	Supt. Homer & Cortland Gas Light Co., Cortland, N. Y.	Sept. 15, 1869
TUBBS, J. NELSON	Rochester, N. Y.	Sept. 3, 1884
TUCKER, HOOD	Eng. in chg. Harriman Coal & Iron Ry., Harriman, Tenn.	Oct. 1, 1890
TULLOCK, ALONZO J.	Propr. Missouri Valley Bridge and Iron Works, Leavenworth, Kan- sas.	June 6, 1883
TYSON, A. HARVEY	526 Court st., Reading, Pa.	Oct. 2, 1889
UNTHANK, ACHILLES W.	Yuma, Ariz.	July 2, 1873
VAN AUKEN, ALVA M.	Room 13, Essex Bldg., Denver, Colo.	Oct. 2, 1889
VAN BUREN, JOHN D.	Newburgh, N. Y.	May 20, 1868
VAN BUREN, ROBERT	Ch. Eng. Dept. City Works, 153 Remsen st., Brooklyn, N. Y.	June 17, 1868
VANCE, HART	(Vance & Mahlo), Central Block, Middlesborough, Ky.	July 7, 1880
VANDERPOOL, EUGENE	Pres. and Eng. Newark Gas Light Co., Newark, N. J.	Sept. 2, 1874
VAN HORNE, JOHN G.	15 Cortlandt st., Rooms 68 and 69, New York City.	Feb. 4, 1880
VAN SANT, ROBERT L.	Hotel Bozier, 13th and Olive sts., St. Louis, Mo.	Sept. 3, 1880
VAN WINKLE, EDGAR B.	(Care Drexel, Harjes & Co.), 31 Boulevard Haussmann, Paris, France.	Dec. 2, 1868
VARONA, IGNACIO M. DE	Municipal Bldg., Room 29, Brook- lyn, N. Y.	April 7, 1886
VAUGHN, GEORGE W.	Cons. Eng. A. T. & S. F. R. R., Leavenworth, Kans.	June 3, 1891
VEAZIE, JOSEPH	U. S. Asst. Eng. (P. O. Box 209), Boston, Mass.	May 3, 1876
VOORHEES, THEODORE	Gen. Supt. New York Central & Hudson River R. R., Grand Central Station, New York City.	May 6, 1885
WADDELL, JOHN A. L.	Cons. Bridge Eng., Keith & Perry Bldg., Kansas City, Mo.	Oct. 5, 1881
WAGNER, SAMUEL TOBIAS	Supt. of Shops, Phoenix Iron Co., Phoenixville, Pa.	Feb. 2, 1887

## MEMBERS.

79

Name.	Address.	Date of Membership.	
WAITE, CHRISTOPHER C.	Pres. C. H. V. & T. Ry., Columbus, Ohio.	Mar.	3, 1880
WALKER, J. S.	U. S. Engineer's Office, Nashville, Tenn.	Jan.	5, 1881
WALKER, J. W.	Pres. and Gen. Man. Shiffler Bridge Co., Pittsburgh, Pa.	May	7, 1884
WALKER, WILLIAM W.	Gen. Man. Tucson, Globe and Northern R. R., 11 Wall st., New York City.	Oct.	6, 1880
WALLACE, JOHN F.	Eng. Cons. Illinois Central R. R., 78 Michigan ave., Chicago, Ill.	June	2, 1886
WALLACE, J. H.	Asst. Main. Way, S. P. Co. (Pacific System), Fourth and Townsend sts., San Francisco, Cal.	Jan.	2, 1890
WALTON, CHARLES W.	Eng. and Contractor, Detroit, Mich.	June	4, 1890
WARD, CHARLES D.	Indurated Fibre Co., Oswego, N. Y.	Mar.	3, 1869
WARD, JOHN F.	291 Montgomery st., Jersey City, N. J.	Oct.	6, 1886
WARD, LEBBEUS B.	Taylor's Hotel, Jersey City, N. J.	Mar.	16, 1870
WARDLAW, JAMES R.	305 West 138th st., New York City.	Mar.	3, 1886
WARE, R. WILLARD	Plainfield, N. J.	April	1, 1874
WARREN, WILLIAM HENRY	Challis Prof. Eng., Univ. Sidney, N. S. W., Australia.	Feb.	5, 1890
WASHBURN, FRANK S.	Purdy's Station, Westchester Co., N. Y.	Nov.	7, 1888
WATKINS, FREDERICK W.	118 East 115th st., New York City.	Oct.	3, 1883
WATSON, WILLIAM P.	Ch. Eng. Seattle & Montana Ry., Seattle, Wash.	June	1, 1887
WEGMANN, EDWARD, Jr.	Div. Eng. New Croton Aqueduct, 324 St. Nicholas ave., New York City,	Mar.	7, 1888
WEINHAGEN, F.	Eng. and Man. Wisconsin Bridge and Iron Co., San Antonio, Texas.	July	4, 1888
WEIR, FREDERICK C.	Pres. The Weir Frog. Co., Cincinnati, Ohio.	Aug.	7, 1872
WEISKOPE, SAMUEL C.	Civil Eng. and Eastern Agt. { J. Keystone Bridge Co., 44-46 Wall st., New York City. { M.	May	7, 1884
		Dec.	5, 1889
WELLINGTON, ARTHUR M.	Editor <i>Engineering News</i> , Tribune Bldg., New York City.	May	4, 1881
WELLMAN, DAVID WILLARD	Asst. Eng. Mo. River Comm., 1515 Lucas pl., St. Louis, Mo.	Oct.	5, 1870
WENTWORTH, CHARLES C.	Eng. and Man. American Bridge and Iron Co., Roanoke, Va.	April	4, 1888
WENTWORTH, WILLIAM H.	Ch. Eng. Monterey and Mexican Gulf Ry., Monterey, Mexico.	Jan.	2, 1889
WESTINGHOUSE, GEORGE, Jr.	Pittsburgh, Pa.	Jan.	7, 1891

Name.	Address.	Date of Membership.	
WESTON, EDMUND B.	Asst. City Engineer in charge of Water Dept. (Lock Box 1071), Providence, R. I.	Dec.	6, 1882
WETHERILL, WILLIAM C.	Gen. Man. Empire Zinc Co., Joplin, Mo.	Dec.	1, 1886
WHEELER, EBENEZER S.	U. S. Asst. Eng., Sault Ste. Marie, Mich.	Nov.	7, 1883
WHEELER, L. L.	U. S. Asst. Eng., Illinois and Miss. Canal, Milan, Ill.	June	4, 1884
WHEELER, ORLANDO B.	U. S. Asst. Eng., 1515 Lucas pl., St. Louis, Mo.	Nov.	2, 1887
WHEELER, SCHUYLER S.	Pres. Crocker-Wheeler Elec. Motor Co., 430 West 14th st.; Electrical Expert Board Electrical Control, 1266 Broadway, New York City.	J. Mar. 2, 1887 M. Feb. 6, 1889	
WHINERY, SAMUEL	(Director.) Vice-Pres. Warren-Scharf Asphalt Paving Co., 23 Blymyer Bldg., Cincinnati, Ohio.	J. April 1, 1874 M. May 4, 1881	
WHISTLER, THOMAS D.	(Care Alexander Brown & Son), Baltimore, Md.	J. Mar. 5, 1884 M. May 2, 1888	
WHITCOMB, HENRY D.	Cons. Eng. (Talcott & Whitcomb, Civil Engs.), Richmond, Va.	Feb.	21, 1872
WHITE, GEORGE H.	Prof. Civil Eng., Worcester Pol. Inst., 20 Shattuck st., Worcester, Mass.	May	2, 1883.
WHITE, HENRY F.	Ch. Eng. B. C. R. & N. Ry., Cedar Rapids, Iowa.	Jan.	2, 1890
WHITE, TIMOTHY S.	Vice-Pres. and Ch. Eng. Penn Bridge Co., Beaver Falls, Pa.	April	3, 1889
WHITE, W. HOWARD	74 Wall st., New York City.	Mar.	5, 1873.
WHITELAW, JOHN	Supt. Water Works, 354 Superior st., Cleveland, Ohio.	Feb.	5, 1873
WHITFORD, OSCAR F.	Engs. Office, Michigan Central Ry., Detroit, Mich.	Dec.	6, 1871
WHITLOCK, FRANK W.	City Eng. (P. O. Box 715), Waterbury, Conn.	J. Oct. 4, 1876 M. April 1, 1885	
WHITNEY, FRANK O.	City Hall, Boston, Mass.	J. May 3, 1876 M. Jan. 5, 1887	
WHITNEY, JOSEPH	Cambridgeport, Mass.	July	10, 1872
WHITTEMORE, DON J.	(Past-President.) Ch. Eng. Chicago, Milwaukee & St. Paul Ry., Rand & McNally Bldg., Chicago, Ill. (Residence: 222 Biddle st., Milwaukee, Wis.)	July	10, 1872
WHITTEN, NATHAN H.	Eng. Holyoke Machine Co., Holyoke, Mass.	Jan.	7, 1876.

Name.	Address.	Date of Membership.	
WHITTON, ANDREW D.	Ch. Eng. Phila. Traction Co., 23d and Brown sts., Philadelphia, Pa.	May	6, 1891
WILDER, FRANCIS M.	230 Niagara st., Buffalo, N. Y.	Jan.	5, 1881
WILEY, WILLIAM H.	Civil Eng., 53 East 10th st., New York City.	Feb.	17, 1869
WILKINS, WM. GLYDE	(Wilkins & Davison, Civil Engs.), Westinghouse Bldg., Pittsburgh, Pa.	Dec.	4, 1889
WILLARD, JAMES E.	Crescent Hill, Ky.	May	1, 1889
WILLIAMS, EDWARD H.	(Burnham, Parry, Williams & Co.), Baldwin Locomotive Works, 500 North Broad st., Philadelphia, Pa.	Sept.	5, 1883
WILLIAMSON, F. STUART	Civil and Mech. Eng., 1 Broadway, New York City.	Sept.	7, 1887
WILLIAMSON, WM. GARNETT	Asst. Eng. Elk Riv. Div. M. S. Canal, Wheeler, Ala.	April	4, 1883
WILSON, ARTHUR OWEN	Sec., Treas. and Gen. Man. The Huntsville Belt Line and Monte Sano Ry. (P. O. Box 5), Huntsville, Ala.	Mar.	7, 1888
WILSON, CHARLES A.	Ch. Eng. W. & L. E. Ry., Toledo, Ohio,	April	1, 1891
WILSON, ELLIOTT H.	(Wilson & Gillie, Civil and Min. Engs.), Butte, Mont.	Feb.	1, 1888
WILSON, GEORGE L.	Asst. City Eng. and Supt. of Sewers, St. Paul, Minn.	Feb.	5, 1890
WILSON, HENRY W.	Civil Eng., Drexel Bldg., Philadelphia, Pa.	Sept.	6, 1876
WILSON, HERBERT M.	Irrigation Eng. U. S. Geological Survey, Washington, D. C.	J. Sept. M. Jan.	5, 1883 2, 1890
WILSON, JOHN A.	Civil Eng., Drexel Bldg., Philadelphia, Pa.	June	7, 1876
WILSON, JOSEPH M.	Civil Eng. and Architect, Drexel Bldg., Philadelphia, Pa.	April	2, 1873
WIMMER, SEBASTIEN	Civil Eng., St. Mary's, Elk Co., Pa.	Mar.	2, 1881
WISNER, GEORGE Y.	Civil Eng., 39 W. Canfield ave., Detroit, Mich.	April	5, 1876
WOLCOTT, CHRISTOPHER C.	Civ. Eng., U. S. N., U. S. Navy Yard, Mare Island, Cal.	Mar.	5, 1884
WOOD, JOSEPH	Gen. Man. Penna. Lines West of Pittsburgh, 1003 Penn. ave., Pittsburgh, Pa.	April	1, 1874
WOODBURY, CHARLES J. H.	Vice-Pres. Boston Mfrs. Mutual Fire Ins. Co., 31 Milk st., Boston, Mass.	Dec.	3, 1884



Name.	Address.	Date of Membership.	
WOODFORD, ETHELBERT G.	23 Broad st. ave., New Broad st., London, E. C., England.	June	4, 1890
WORTHEN, WILLIAM E.	( <i>Past-President.</i> ) 63 Bleecker st., New York City.	Dec.	4, 1867
WRIGHT, AUGUSTINE W.	503 Phenix Bldg., Chicago, Ill.	May	5, 1886
WRIGHT, EDWARD T.	Abstract Bldg., Los Angeles, Cal.	Feb.	3, 1886
WRIGHT, GEORGE F.	City Surveyor, Santa Barbara, Cal.	Jan.	4, 1888
WROTNOWSKI, ARTHUR F.	Res. Eng. Tampico Harbor Co., Tampico, Mexico.	July	12, 1877
WURTELE, ARTHUR S. C.	Deputy State Eng. and Surveyor, State Hall, Albany, N. Y.	Mar.	5, 1873
YEATMAN, CHARLES P.	Inspector U. S. Dike at Rising Sun, Rising Sun, Ind.	Feb.	2, 1887
YONGE, SAMUEL H.	Div. Eng. Mo. River Com., N. W. Cor. 6th and Wyandotte sts., Kansas City, Mo.	May	5, 1880
YOUNG, JOHN	Geneseo, N. Y.	Mar.	7, 1888

MEMBERS, 1,110.

---

## ASSOCIATE MEMBERS.

---

[A. M. Am. Soc. C. E.]

Name.	Address.	Date of Membership.	
ARENTZ, F. C. H.	Engr. and Contractor, Box 422, Harrisburg, Pa.	May	6, 1891
CARLL, DAVID S.	Asst. Eng. W. & G. Ry., } J.	March	7, 1888
	Georgetown, D. C. } A. M.	July	1, 1891
CATTELL, WILLIAM A.	Asst. Ch. Eng. Long Island R. R., Long Island City, N. Y.	May	6, 1891
FARLEY, JOHN MOYER	Asst. Eng. N. Y. State Can- nals, Box 84, Syracuse, } J.	Dec.	5, 1888
	N. Y. } A. M.	July	1, 1891
GRANT, THOMAS H.	Red Bank, N. J.	May	6, 1891

## ASSOCIATE MEMBERS.

83

Name.	Address.	Date of Membership.	
HEALY, JOHN F.	Asst. Eng. A. G. S. & N. O. & N. E. Rys., Birming- ham, Ala.	{ J. Jan. 2, 1890 A. M. June 3, 1891	
JANNEY, WILLIAM D.	Div. Eng. Norfolk & Western R. R., Ohio Ex., Ceredo, W. Va.	May 6, 1891	
JORDAN, WILLIAM F.	Asst. Ch. Eng., Buffalo, Rochester & Pittsburgh R. R., Rochester, N. Y.	April 1, 1891	
MEAD, DANIEL W.	Eng. and Gen. Man. Rockford Constr. Co., Rockford, Ill.	July 1, 1891	
MODJESKI, RALPH	Inspector Memphis Bridge Superstructure, Athens, Pa.	{ J. Dec. 1, 1886 A. M. July 1, 1891	
MORLEY, FRED.	Instructor Engineering Dept., Michigan University, Ann Arbor, Mich.	May 6, 1891	
PENNYPACKER, LEVIS P.	113 West 38th st., New York City.	April 1, 1891	
PORTER, ALBERT H.	Res. Eng., Cataract Cons. Co., Niagara Falls, N. Y.	{ J. July 4, 1888 A. M. July 1, 1891	
SISSON, WM. LEE	Asst. Eng., B. & O. R. R., 219 East Townsend st., Baltimore, Md.	{ J. June 4, 1890 A. M. July 1, 1891	
STARRETT, THEODORE	Eng. and Contractor, 374 The Rookery, Chicago, Ill.	May 6, 1891	
STOUT, EDMUND C.	42 Broadway, New York City.	May 6, 1891	
THOMSON, T. KENNARD	Eng. Bridges, Ohio Ex., Norfolk & Western R. R., Kenova, W. Va.	{ J. Oct. 3, 1888 A. M. June 3, 1891	
TRATMAN, E. E. RUSSELL	103 Tribune Bldg., New York City.	{ J. April 7, 1886 A. M. July 1, 1891	
URQUHART, GEORGE C.	Asst. Eng., Pittsburgh Div., Pitts- burgh, Cincinnati, Chicago & St. Louis Ry., Steubenville, Ohio.	May 6, 1891	
VON GEMMINGEN, SIGMUND	Asst. Eng., C. & O. R. R., Nuttall, W. Va.	May 6, 1891	
WALKER, CLEMENT I.	Asst. Eng. Empire City Subway Co., 113 W. 38th st., New York City.	April 1, 1891	

Name.	Address.	Date of Membership.	
WARNER, EDWIN HALL	(Warner & Warner, Engs.), P. O. Box 190, Seattle, Wash.	May	6, 1891
WEBSTER, ALBERT LOWRY	Civil and San. Eng., 107 Drexel Bldg., Wall and Broad sts., New York City.	J. Sept. 6, 1882 A. M. June 3, 1891	
WILKES, JAMES K.	9 Pleasant st., Danbury, Conn.	June	3, 1891
WÜLFEL, PAUL L.	Asst. Ch. Eng., Pencoyd Iron Works, Bridge Cons. Dept., Pencoyd, Pa.	J. July 3, 1889 A. M. July 1, 1891	

ASSOCIATE MEMBERS, 25.

## ASSOCIATES.

[Assoc. Am. Soc. C. E.]

Name.	Address.	Date of Membership.	
ABBOTT, WILLIAM L.	Chairman Carnegie, Phipps & Co. (Ltd.), 42 5th ave., Pittsburgh, Pa.	May	1, 1889
BARNES, WILLIAM H.	Pres. and Receiver Allegheny Valley R. R., 234 South 4th st., Philadelphia, Pa.	Sept.	2, 1885
BEARDSLEY, ARTHUR	Prof. Eng. and Director of the Mechanic Arts, Swarthmore College, Swarthmore, Pa.	Sept.	1, 1875
BELCHER, GEORGE C. W.	Manufacturing Chemist, 121 Locust st., St. Louis, Mo.	May	5, 1880
BERG, LOUIS DE COPPET	Architect, 111 Broadway, New York City.	June	6, 1888
BOGART, SAMUEL S.	Edison Gen. Elec. office, Broad st., New York City. (Residence, Schraalenburgh, N. J.)	April	7, 1886
BRADBURY, HENRY R.	Secy. Warren-Scharf Asphalt Paving Co. 81 Fulton st., New York City.	July	1, 1881
BRADLEY, C. W.	Gen. Supt., West Shore R. R., West 42d st. Ferry, New York City. (Residence, West Englewood, N. J.)	June	19, 1891

## ASSOCIATES.

85

Name.	Address.	Date of Membership.	
BREUCHAUD, JULES	Contractor, 204 West 121st st., New York City.	June	5, 1889
BROWN, JACOB B.	P. O. Box 501, Newport, R. I.	Sept.	6, 1871
BURNHAM, GEORGE, Jr.	500 North Broad st., Philadelphia, Pa.	{ J. A.	Jan. 6, 1875
BURROWS, GEORGE L.	Saginaw, Mich.		July 2, 1890
		Feb.	3, 1886
CARD, JOSEPH P.	Pres. Chicago Tie Preserving Co., 15th and Clark sts., Chicago, Ill.	Sept.	5, 1883
COMER, H.	Supt. Lehigh Valley Creosoting Co., Jersey City, N. J.	May	5, 1891
COMFORT, SILAS G.	Prof. Architecture and Bridge Cons., Penna. Military Academy, Chester, Pa.	March 31, 1891	
COMPTON, ALFRED G.	Prof. of Applied Mathematics, College City of New York, 17 Lexington ave., New York City.	Sept.	5, 1877
CRAFTS, GEORGE H.	Civil Eng. and Contractor, Box 245, Atlanta, Ga.	April	4, 1888
DAVIS, EMORY C.	City Eng., Northampton, Mass.	Dec.	4, 1872
DAVIS, J. WOODBRIDGE	32 East 45th st., New York City.	June	3, 1885
DU BARRY, EDMUND L.	Supt. Norfolk Div. Norfolk & Western R. R., Crewe, Va.	Jan.	6, 1875
DUNN, JAMES R.	40 Wall st., New York City.	March 31,	1891
FLETCHER, ROBERT	Prof. of Civil Eng., Thayer School of Civil Engineering, Dartmouth College, Hanover, Grafton Co., N. H.	Nov.	4, 1874
FROST, GEORGE H.	Man. <i>Engineering News</i> , 105 Tribune Bldg., New York City.	Jan.	4, 1882
FUTAMI, KIOSABURO	Kobe Paper Mill Co., Kobe, Japan.	June	5, 1889
GIBSON, WILLIAM, Jr.	Publisher, <i>The Engineering Record</i> , 277 Pearl st., New York City.	Sept.	5, 1888
GOODELL, JOHN M.	108 East 23d st., New York City.	July	29, 1891
GOODMAN, EDWARD H.	Pres. The Union Switch and Signal Co., Swissvale, Pa.	June	4, 1891
GRIFFIN, P. H.	Pres. New York Car Wheel Works, Buffalo, N. Y.	Oct.	1, 1890
HALL, CLAYTON C.	Cons. Actuary, 10 South st., Baltimore, Md.	March	3, 1886

Name.	Address.	Date of Membership.	
HAMMOND, HENRY B.	Pres. Indianapolis, Decatur & Western Ry. and Boston & New York Air Line R. R., 2 Wall st., New York City.	July	7, 1880
HANDY, FRANK W.	Avondale, Cincinnati, Ohio.	Oct.	6, 1886
HARDWICKE, ALAN H. G.	Gen. Man. and Treas., Hardwick & Ware Mfg. Co., Buffalo, N. Y.	June	4, 1884
HARRIS, CHARLES M.	54 Pine st., New York City.	Jan.	8, 1873
HAZEN, JOHN V.	Prof. Civil Eng., Chandler Sci. School, Dartmouth College, Hanover, N. H.	June	5, 1889
HENDRIE, JOHN S.	Contractor, Hamilton, Ontario, Canada.	Sept.	7, 1881
HOWE, MALVERD A.	Prof. Civil Eng., Rose Pol. Inst., 637 Cherry st., Terre Haute, Ind.	May	7, 1890
HUNSIKER, MILLARD	Eng. of Tests, Carnegie, Phipps & Co., Pittsburgh, Pa.	June	5, 1889
JACOBY, HENRY S.	Asst. Prof. Civil Engineering, Cornell University, 3 Quarry st., Ithaca, N. Y.	Nov.	5, 1890
KARNER, WILLIAM J.	205 La Salle st., Chicago, Ill.	July	2, 1890
KING, H. W.	Secy. The King Iron Bridge and Mfg. Co., Cleveland, Ohio.	June	19, 1891
LAWSON, LEONIDAS M.	102 Broadway, New York City.	Dec.	3, 1879
LEWIS, FRANK C.	Eng. Youngstown Bridge Co., Youngstown, Ohio.	June	5, 1889
LEWIS, JAMES F.	Rand Drill Co., 23 Park pl., New York City.	Feb.	6, 1889
LIVINGSTON, J. I.	Man. Standard Paint Co., Bound Brook, N. J.	July	3, 1889
LOCKWOOD, JOHN	Gas and Hydr. Eng., 52 Broadway, New York City,	April	5, 1882
McKINNEY, ROBERT C.	Secy. and Treas. Niles Tool Works, Hamilton, Ohio.	Oct.	6, 1886
MILLER, SPENCER	Mech. Eng., 96 Liberty st., New York City.	July	3, 1889
MOXHAM, ARTHUR J.	Pres. Johnson Steel Street Rail Co., Johnstown, Pa.	Nov.	2, 1887
NICOL, THOMAS W.	Cons. Eng. Mobile Trans. Co., and Mobile, Jackson & Kansas City R. R., 64 St. Francis st., Mobile, Ala.	June	7, 1882



## ASSOCIATES.

87

Name.	Address.	Date of Membership.
OASTLER, WM. CHURCHILL	Cons. Eng. on Highways, 43 Exchange Place, New York City.	March 31, 1891
PARSONS, GEORGE W.	Supt. Frog Switch and Signal Dept., Pennsylvania Steel Co., Steelton, Pa.	Sept. 3, 1884
PHILLIPS, HENRY A.	Exchange Bldg., Room 409, Boston, Mass.	April 7, 1886
POMEROY, LEWIS R.	29 Broadway, New York City.	April 2, 1890
PRATT, ROBERT J.	Treas. and Man. Electric Mfg. and Gas Engine Co., Greenbush, N. Y.	May 4, 1877
PUTNAM, JOSEPH W.	Civil Eng. and Gen. Contractor, P. O. Box 253, New Orleans, La.	March 3, 1880
REEVES, PAUL S.	760 South Broad st., Philadelphia, Pa.	Sept. 6, 1882
RICHARDS, JOSEPH R.	Architect, 44 Court st., Boston, Mass.	Feb. 4, 1880
ROBERTS, WILLIAM	Waltham, Mass.	June 4, 1884
SPEED, JAMES B.	Pres. Western Cement Co., Louisville, Ky.	May 2, 1888
STONE, WATERMAN	Gen. Man. Interstate Consolidated Rapid Transit Ry., Kansas City, Kans.	Dec. 1, 1886
SWAIN, GEORGE F.	Prof. Civil Eng., Massachusetts Institute of Technology; Eng. Mass. Board R. R. Com., Boston, Mass.	Sept. 5, 1883
TOMKINS, CALVIN	150 Broadway, New York City.	Jan. 6, 1886
TRAUTWINE, JOHN C., Jr.	3301 Haverford st., Philadelphia, Pa.	Dec. 5, 1888
WARDER, JOHN H.	489 La Salle st., Chicago, Ill.	March 7, 1888
WATKINS, J. ELFRETH	Curator Section Transportation and Engineering and Eng. Property, U. S. National Museum, Washington, D. C.	Jan. 2, 1889
WATSON, WILLIAM	Secy. Am. Academy of Arts and Sciences; address, 107 Marlborough st., Boston, Mass.	March 1, 1882
WHEATON, EDWARD	Boston, Mass.	March 3, 1880

Name.	Address.	Date of Membership.
WOODWARD, C. M.	Thayer Prof. of Applied Mechanics and Higher Mathematics, Dean of Polytechnic School, Washington Univ., St. Louis, Mo.	June 2, 1886
YOUNG, FRED. STAFFORD	Asst. to Pres. of and Secy. Gilbert Car Mfg. Co., Troy Club, Troy, N. Y.	April 7, 1886

ASSOCIATES, 69.

## JUNIORS.

[Jun. Am. Soc. C. E.]

Name.	Address.	Date of Membership.
ABBOTT, ARTHUR V.	(Care Ogden City Street Ry.), Ogden, Utah.	Jan. 5, 1881
ABBOTT, EDWARD L.	Supt. Bridge Cons. (care Union Bridge Co.), Alexandria, La.	Sept. 1, 1886
ADAMS, JULIUS L.	Adams Eng. Co., Gate City Bank Bldg., Atlanta, Ga.	Jan. 4, 1888
ALLEN, THOMAS W.	City Surv., with Title Guarantee Co., 183 West 73d st., New York City.	Dec. 5, 1888
BAIER, JULIUS	Prin. Asst. Eng. Merchant's Bridge Terminal Ry., 52 Laclede Bldg., St. Louis, Mo.	Sept. 7, 1887
BAINBRIDGE, FRANCIS H.	Asst. Eng. Edge Moor Bridge Works, Wilmington, Del.	Jan. 4, 1888
BARNEY, SAMUEL E., Jr.	Instructor Civil Eng., Yale Univ., 346 Whitney ave., New Haven, Conn.	June 2, 1886
BEHRENS, WILLIAM F.	Asst. Eng. Zuni Mt. Ry., P. O. Box 497, Albuquerque, N. M.	Nov. 6, 1889
BELKNAP, WILLIAM E.	P. R. R. offices, Jersey City, N. J.	March 31, 1891
BELL, GILBERT J.	(Care A. T. & S. F. R. R.), Sibley, Mo.	Sept. 7, 1887
BERRALL, JAMES	First Asst. Eng., G. W. Vanderbilt Estate, Biltmore, N. C.	May 5, 1891

## JUNIORS.

89

Name.	Address.	Date of Membership.	
BETTES, CHARLES R.	(Care Charles B. Brush), 1 Newark st., Hoboken, N. J.	Oct.	1, 1890
BEUGLER, EDWIN J.	Philadelphia & Reading R. R., Reading, Pa.	June	19, 1891
BISSELL, FRANK E.	Supt. N. M. Div. U. P. Ry., Room 5, Union Depot, Denver, Colo.	April	2, 1884
BLAKELEY, GEORGE H.	Ch. Eng. Passaic Rolling Mill, Paterson, N. J.	Dec.	4, 1889
BLANC, FREDERICK N.	Pres. "Litofuge" Mfg. Co., 62 John st., New York City.	July	5, 1882
BLODGETT, JOHN	Constr. Dept. N. P. R. R., St. Paul, Minn.	Dec.	4, 1889
BLUNT, R. ALLAN	Office Director Gen. of Rys., Simla, Punjab, India.	June	4, 1891
BOGART, JAMES P.	Eng. Conn. Shell Fishery Commission, New Haven, Conn.	Jan.	4, 1882
BOGGS, EDWARD M.	Civil and Hydr. Eng., Banning, Cal.	Oct.	6, 1886
BONNETT, CHARLES P.	421 Westminster ave., Elizabeth, N. J.	June	2, 1886
BOOTH, WILLIAM F.	Poughkeepsie, N. Y.	Jan.	7, 1885
BOWDITCH, ERNEST W.	60 Devonshire st., Boston, Mass.	Feb.	3, 1875
BRERETON, THOMAS J.	Supervisor Tyrone Div. Pennsylvania R. R., Osceola, Pa.	Oct.	7, 1885
BROWN, C. NEWTON	Prof. Civil Eng. Ohio State University, 1343 Forsythe ave., Columbus, Ohio.	Nov.	3, 1886
BROWN, WILLIAM C.	86 Liberty st., New York City.	Sept.	1, 1886
BRYAN, KENNERLEY	Ch. Eng. Hale Elevator Co., 187 La Salle st., Chicago, Ill.	March	5, 1890
BURDETT, CHARLES L.	21 Trust Co. Block, Hartford, Conn.	Jan.	6, 1875
BUTTS, EDWARD	City Eng., 608 Exchange Bldg., Kansas City, Mo.	April	6, 1881
BUTTS, E. P.	Res. Eng. Burlington Bridge, Burlington, Iowa.	Nov.	3, 1886
BYERS, MORTON L.	Asst. Eng. Main. Way Ind. Div. P. C. C. & St. L. Ry., 321 N. Alabama st., Indianapolis, Ind.	Jan.	2, 1890
CARRERE, J. MAXWELL	(Care Carrere & Hass Standard Iron and Bronze Works), 36 Park Place, New York City.	Oct.	7, 1885
CARROLL, EUGENE	Civ. Eng. (with Moffet, Hodgkins & Clarke, Syracuse, N. Y.), Peoria Water Co., Peoria, Ill.	Jan.	4, 1888
CHADBOURN, W. H., JR.	U. S. Asst. Eng., Beaufort, N. C.	Dec.	3, 1890

Name.	Address.	Date of Membership.
CHAPIN, LOOMIS E.	Assoc. Eng. J. D. Cook, Rooms 47 and 48, Produce Exchange, Toledo, Ohio.	Dec. 3, 1884
CHIBAS, EDUARDO J.	Res. Eng. Ysabelita Manganese Mines, Santiago, Cuba.	March 31, 1891
CLARK, WILLIAM G.	First Asst. City Eng., City Engrs. office, Toledo, Ohio.	April 4, 1888
CLARKE, ST. JOHN	(Care Passaic Rolling Mill Co.), Paterson, N. J.	Sept. 5, 1888
CLARKSON, ROBERT C.	(Care Wilson Bros. & Co.), Drexel Bldg., Philadelphia, Pa.	Jan. 5, 1887
COLE, GEORGE W.	Asst. Eng. Water Works Ex., Chain of Rocks, St. Louis, Mo.	Dec. 4, 1889
CONNOR, E. H.	Asst. Eng. N. Y. L. E. & W. R. R., 21 Cortlandt st., New York City.	Feb. 5, 1890
CONOVER, ALLAN D.	Prof. of Civ. Eng., University of Wisconsin, Madison, Wis.	June 4, 1884
CORNELL, J. N. HAYWARD	215 West 134th st., New York City.	May 1, 1890
CRANDALL, CHARLES L.	Assoc. Prof. of Civil Eng. in chg., R. R. Eng. and Geodesy, Cornell University, Ithaca, N. Y.	June 7, 1876
CRANE, WILL E.	Eng. in chg., Platt St. Bridge, Rochester, N. Y.	May 1, 1889
CREUZBAUR, R. WALTER	Mech. Draftsman, New Aqueduct Comm., 213 Stewart Bldg., New York City.	April 2, 1890
CUMMINGS, ROBERT A.	Asst. Eng. Maint. Way Dept., N. & W. Ry., Roanoke, Va.	Oct. 1, 1890
CUSHING, WILLIAM C.	Eng. Main. Way Ind. Div. P. C. C. & St. L. Ry., Indianapolis, Ind.	June 5, 1889
DAVIS, CHANDLER	Dept. of Docks, Pier A, New York City,	Dec. 3, 1890
DAVIS, HENRY L.	City Hall, New Haven, Conn.	Nov. 5, 1890
DAVIS, JOSEPH B.	Asst. Prof. Civil Eng., University of Michigan, Ann Arbor, Mich.	April 1, 1874
DEANS, CHARLES HERBERT	Asst. Eng., Sooy Smith & Co., Fort White, Fla.	Dec. 3, 1890
DE LANCEY, EDWARD E.	Leveler Aqueduct Com., Reservoir "M," Purdy's Station, Westchester Co., N. Y.	Feb. 5, 1890
DOWNES, STANCLIFF B.	Civil Eng., 1071 Madison ave., New York City.	April 7, 1886
DUBOIS, A. JAY	Prof. of Civil Eng., Sheffield Scientific School of Yale College, New Haven, Conn.	July 7, 1875

Name.	Address.	Date of Membership.	
DURYEA, EDWIN, JR.	Civil Eng. with Washburn, Shaler & Washburn, Civil Engrs. and Contractors, Tolleston, Ind.	Feb.	2, 1887
DUSENBURY, WALTER L.	358 Produce Exchange, New York City.	Nov.	5, 1890
EARL, GEORGE G.	(Williamson & Earle, Civil and San. Engrs.), Americus, Ga.	May	7, 1890
EDES, WILLIAM C.	Asst. Eng. Southern Pacific Co., R. R. Bldg., Room 79, San Francisco, Cal.	Sept.	1, 1886
ELLSWORTH, ALFRED B.	Res. Eng. Pittsburgh Testing Laboratory (Address: Care Union Bridge Co., Athens, Pa.)	May	1, 1889
ERLANDSEN, OSCAR	Asst. Ch. Eng. Dutchess Co. R. R., Poughkeepsie, N. Y.	May	1, 1889
EWING, WILLIAM B.	Civil Eng., 4136 Ellis ave., Chicago, Ill.	April	3, 1889
FARGUSSON, MARK	Cons. Eng. Southport, N. C.	Dec.	5, 1888
FARRINGTON, HARVEY	Asst. Eng. N. Y. C. & H. R. R. R., Croton-on-Hudson, N. Y.	June	19, 1891
FERGUSON, WILLIAM L.	Civil Eng., 1632 N. 15th st., Philadelphia, Pa.	May	1, 1889
FERRER, CARLOS F.	39 Broad st., New York City.	Sept.	2, 1885
FIELD, WILLIAM P.	Civil Eng., 745 Broad st., Newark, N. J.	Dec.	7, 1887
FISHER, ELSTNER	109 Howard st., Detroit, Mich.	April	3, 1889
FOLWELL, A. P.	92 Day st., Orange, N. J.	Feb.	5, 1890
FOUQUET, LOUIS D.	Asst. Eng. Zig Zag Tunnel, N. Y., O. & W. R. R., Middletown, N. Y.	Jan.	7, 1891
FOWLER, C. E.	Banning, Cal.	May	7, 1890
FRENCH, JAMES B.	(Care Pencoyd Bridge and Cons. Co.), Pencoyd, Pa.	Feb.	6, 1889
FUERTES, JAMES H.	Box 117, Camden, Ark.	May	2, 1888
FULLER, WILLIAM B.	Eng. Everett Land Co., Snohomish, Wash.	June	3, 1885
FURMAN, J. R.	47 West 19th st., New York City.	July	2, 1890
GAHAGAN, WALTER H.	(Care St. L. A. & T. Ry.), Pine Bluff, Ark.	Sept.	5, 1888
GOLDSMITH, NATHANIEL O.	Eng. The Weir Frog Co., Cincinnati, Ohio.	June	2, 1886
GOSLING, EDGAR B.	Min. and Civil Eng., in charge of erection Buildings, etc., for Suez Canal Co., Port Tewfik, Egypt.	May	4, 1887



Name.	Address.	Date of Membership.
GRAY, WILLIAM	(Care Aqueduct Commrs.), Carmel, N. Y.	May 2, 1888
GRIFFITH, JOHN EDGAR	Res. Eng. Canadian Pacific Ry., Donald, B. C.	April 3, 1889
GUPPY, B. W.	Asst. Eng. B. & M. R. R., Boston, Mass.	June 19, 1891
HAINES, CASPAR W.	Cheltenham, Pa.	Feb. 2, 1876
HAMILTON, MORRISON C.	Div. Eng. N. Y. N. H. & H. R. R., Box 914, New Haven, Conn.	Nov. 6, 1889
HARWI, SOLOMON J.	Asst., Ch. Engrs. office L. V. R. R., Allentown, Pa.	Dec. 4, 1889
HASBROUCK, CHARLES A.	Prin. Asst. Eng. Am. Bridge Works, 40th st. and Stewart ave., Chicago, Ill.	March 7, 1887
HAWES, ARCHIE McL.	Eng. Everett Water Works, Box 1598, Tacoma, Wash., and 23 Essex Bldg., Denver, Col.	Nov. 2, 1887
HAWLEY, WM. CHAUNCEY	Asst. to Chester B. Davis, 549 The Rookery, Chicago, Ill.	Oct. 1, 1890
HAYNES, G. F.	10 Tremont st., Boston, Mass.	April 6, 1887
HILDRETH, RUSSELL W.	Civil Eng. (R. W. Hildreth & Co.), 2 Wall st., New York City.	Jan. 4, 1888
HODGE, HENRY W.	Asst. Eng. Phoenix Bridge Co., Phoenixville, Pa.	Jan. 5, 1887
HOLBROOK, FRANCIS N.	Supt. Corralitos Mining Co., Corralitos, Mexico.	March 2, 1881
HOPPER, JOHN J.	163 West 122d st., New York City.	May 5, 1886
HORTON, SANDFORD	(Care Dist. Supt. Pullman Palace Car Co.), Union Depot, St. Louis, Mo.	Feb. 7, 1877
HOWE, HORACE J.	Elmira, N. Y.	May 2, 1888
INGALLS, OWEN L.	Asst. Eng. Sewer Dept., 1138 13th st., N. W., Washington, D. C.	March 5, 1890
ILLSLEY, WILLIAM A.	Tahlequah, Indian Territory.	Feb. 3, 1875
JENCKES, LAWRENCE B.	Eng. So. Manchester Water Co. and Eng. Manchester Sanitary and Sewerage Co., South Manchester, Conn.	March 31, 1891
JEWETT, WILLIAM B.	Box 846, New Rochelle, N. Y.	June 4, 1891
JOHNSON, SINCLAIR J.	Phoenixville, Pa.	Jan. 7, 1885
JOHNSTON, STEWART	Supt. The Pittsburgh Steel Casting Co., Pittsburgh, Pa.	March 6, 1889

Name.	Address.	Date of Membership.	
KELLOGG, NORMAN B.	(Care A. J. Swift, Ch. Eng. D. & H. C. Co.), Albany, N. Y.	Feb.	6, 1878
KELSEY, CLIFFORD S.	Asst. Eng., U. S. Eng. Office, 39 Whitehall st., New York City.	April	3, 1889
KIBBE, AUG. S.	Asst. Eng., State Engrs. office, Albany, N. Y.	March	6, 1889
KOBAYASHI, KAYAJIRO	San. Eng. to Sanitary Bureau, Home Dept., Tokio, Japan.	Feb.	1, 1888
KONDO, TORAGORO	(Care Engineering College, Imperial University), Tokio, Japan.	Oct.	3, 1888
LANT, FRANK P.	138 West 61st st., New York City.	Oct.	3, 1888
LATHAM, NORMAN S.	Div. Eng., Broadway Cable Cons., 589 11th ave., Brooklyn, N. Y.	July	3, 1889
LAWLOR, FRANK D. H.	(Care Am. Soc. C. E.), 127 E. 23d st., New York City.	Oct.	6, 1886
LAWLOR, THOMAS F.	Res. Eng. E. and W. Approach. Poughkeepsie Bridge, Poughkeepsie, N. Y.	June	5, 1889
LELAND, GEORGE H.	65 Westminster st., Providence, R. I.	May	2, 1887
LORINI, MARIO	Asst. Eng. Dept. Public Works, New York City. (P. O. Box 646, Yonkers, N. Y.)	Sept.	4, 1889
LYDON, WILLIAM A.	Asst. Eng. New Lake Tunnel, foot Park row, Chicago, Ill.	Jan.	4, 1888
MACKENZIE, WILLIAM B.	Asst. Eng. Intercolonial Ry., Moncton, New Brunswick, Canada.	June	7, 1882
MAGOVERN, EDWARD E.	Cons. Eng., P. O. Box 217, South Orange, N. J.	Jan.	2, 1884
MATLACK, CHARLES P.	Res. Eng., I. & G. N. R. R., Palestine, Texas.	Oct.	7, 1885
MCCALLA, RICHARD C.	U. S. Asst. Eng., Black Warrior Imp. Co., Tuscaloosa, Ala.	July	2, 1890
MCCONNELL, EDWARD T.	Eng. Main. Way, P. & E. Ry., Indianapolis, Ind.	May	5, 1891
MCCORMICK, GEORGE K.	Asst. Eng. A. & St. L. R. R., Malone, N. Y.	Feb.	6, 1889
MCCULLOH, WALTER	Div. Eng., New Croton Aqueduct, Brewster, N. Y.	July	4, 1888
MCGUIRE, JAMES C.	The Albany, cor. 17th and H sts., Washington, D. C.	May	5, 1891
McMEEKIN, CHARLES W.	Ch. Eng. D. M. & N. W. Ry., Des Moines, Iowa.	April	2, 1890

Name.	Address.	Date of Membership.	
MILLARD, CURTISS	Roadmaster Charleston, Sumter & Northern R. R., Sumter, S. C.	April	3, 1889
MILLER, CLIFFORD N.	604 Greenup st., Covington, Ky.	June	4, 1891
MILLER, RUDOLPH P.	Supervisor R. & D. R. R., Box 355, Richmond, Va.	Jan.	2, 1890
MITCHELL, EDWIN	Asst. Eng. C. V. R. R., Hagerstown, Md.	Sept.	7, 1887
MOSES, JOHN C.	Draftsman, Detroit Bridge and Iron Works, Detroit, Mich.	July	2, 1890
MOSSCROP, ALFRED M.	Asst. Eng. Rochester Bridge and Iron Works, 11 Thayer st., Rochester, N. Y.	May	4, 1887
MOULTHROP, GEORGE E.	Civil and Min. Eng., Butte, Mont.	Feb.	1, 1888
MYERS, EDMUND T. D., Jr.	Asst. to Gen. Man. Richmond Locomotive and Machine Works, Richmond, Va.	May	2, 1888
NAYLOR, E. B.	Asst. Eng., N. Y. C. & H. R. R. R., 48 Grand Central Station, New York City.	Oct.	1, 1890
NORRIS, ROBERT VAN A.	Asst. Eng. Penn. R. R. Anthracite Coal Cos., P. O. Box 726, Wilkes-barre, Pa.	Dec.	7, 1887
NYE, ALGERNON S., Jr.	Leveler, New Croton Aqueduct, 144 Warburton ave., Yonkers, N. Y.	July	2, 1890
OSTRANDER, JOHN E.	Instructor Civil Eng., Lehigh University, South Bethlehem, Pa.	May	2, 1888
PAINE, GEORGE H.	Swissvale, Pa.	Nov.	5, 1890
PANI, CAMILO E.	Asst. Eng. Mex. Cent. R. R., Mexico, Mexico.	July	2, 1890
PARISH, WAINWRIGHT	Asst. Eng. D. & H. C. Co., Albany, N. Y.	June	4, 1890
PARKER, CHARLES F.	843 East 164th st., New York City.	March	5, 1890
PARSONS, SIDNEY A.	Asst. Eng. Everett Land Co., Snohomish, Wash.	July	2, 1890
PENNY, WILLIAM W.	213 North 8th st., St. Louis, Mo.	April	4, 1888
PERKINS, P. S.	Asst. Eng. N. Y. P. & B. R. R., Providence, R. I.	March	5, 1890
PIERSON, STEPHEN C.	Civil Eng., Meriden, Conn.	Nov.	4, 1874
POLLEDO, YSIDORO	Man. Sta. Barbara Sugar Works, Apartado 167, Matanzas, Cuba.	Jan.	2, 1889
POTTER, ALEXANDER	Asst. Eng., with The Stanwix Eng. Co., Rome, N. Y.	Jan.	4, 1888
PRATT, MASON DELANO	Eng. Street Ry., Cons. Penna. Steel Co., Steelton, Pa.	Sept.	5, 1888

## JUNIORS.

95

Name.	Address.	Date of Membership.
PURDY, CORYDON T.	(Wade & Purdy, Civil and Mech. Engrs.), 228 La Salle st., Room 41, Chicago, Ill.	Feb. 2, 1887
PURSLOW, ERNEST J.	Santa Barbara, Cal.	March 5, 1890
RAASLOFF, HAROLD E. DE	(Care Frazer & Co.), Yokohama, Japan.	Dec. 3, 1884
RICKER, GEORGE ALFRED	112 White Bldg., Buffalo, N. Y.	April 7, 1886
RIDGWAY, ROBERT	Asst. Eng. Aqueduct Commission, Purdy's Station, N. Y.	Feb. 1, 1888
RIGGS, CLINTON L.	Mech. Eng., with Detrick & Harvey Mach. Co., 814 Cathedral st., Baltimore, Md.	Jan. 7, 1891
ROEHM, GEORGE E.	36 Ferry ave., Detroit, Mich.	June 4, 1889
ROGGE, J. C. L.	2800 Third ave., New York City.	March 31, 1891
ROHNERT, BENNO	U. S. Engrs. office, Sault Ste. Marie, Mich.	April 3, 1889
ROSENBERG, FRIEDRICH	Gen. Man. Bessemer Ditch Co., and Eng. Col. Coal and Iron Co., Pueblo, Colo.	Oct. 2, 1889
ROSENWEIG, ALFRED	Man. "La Mexicana" L. & M. Co., and Cal. Land Co. (Ld.), La Paz, Baja California, Mexico.	June 7, 1882
ROSS, ELMER W.	Asst. Eng. Bridge Dept., City Engrs. office, Providence, R. I.	March 5, 1890
ROWLAND, CHARLES B.	Continental Iron Works, Greenpoint, N. Y.	May 2, 1888
SANFORD, DAVID C.	Civil Eng. (P. O. Box 1507), New Haven, Conn.	May 6, 1885
SCARBOROUGH, FRANCIS W.	Eng. M. of W., C. & O. R. R., Cincinnati, O.	Sept. 3, 1890
SEITZINGER, W. W.	Civil Eng., P. O. Box 509, Reading, Pa.	Oct. 2, 1889
SELBY, O. E.	Asst. Eng., Louisville & Jeffersonville Bridge, 20 Ky. Nat. Bank Bldg., Louisville, Ky.	March 4, 1891
SHALER, IRA A.	Washburn, Shaler & Washburn, Civil Engrs. and Contractors, Purdy's Station, N. Y.	July 4, 1888
SHERWOOD, GEORGE W.	Res. Eng. A. & St. L. R. R., Malone, N. Y.	Nov. 6, 1889
SHREVE, ARTHUR L.	Asst. Eng., City Com. Dept., P. O. Box 883, Baltimore, Md.	Nov. 5, 1890
SIKES, GEORGE R.	Civil Eng., Eng. Tonawanda Elec. Ry., 81 and 82 White Bldg., Buffalo, N. Y.	Sept. 7, 1887

Name.	Address.	Date of Membership.	
SMITH, CHARLES H.	Civil Eng., 15 North st., Middletown, N. Y.	June	4, 1890
SMITH, MAXWELL	(Care Keep Mfg. Co.), 809 Broadway, New York City.	Sept.	2, 1885
SMITH, MERRITT H.	Civil Eng., Yonkers, N. Y.	June	5, 1889
SMITH, EUGENE R.	Civil Eng., Islip, Suffolk Co., N. Y.	May	2, 1888
SMITH, PEMBERTON	Asst. Train Master, N. Y. C. & H. R. R. R., Rochester, N. Y.	March	31, 1891
SPEIDEL, HUGO S.	Riverside Bridge and Iron Works, Paterson, N. J.	Feb.	5, 1890
SPIELMAN, JOHN G.	35 Broadway, Room 28, New York City.	March	4, 1891
STAIR, WILLIAM H.	U. S. Engs. office, 89 Euclid ave., Cleveland, Ohio.	May	2, 1888
STANFORD, HOMER REED	With Union Bridge Co., Memphis Bridge Co., 2 Virginia ave., Memphis, Tenn.	Oct.	1, 1890
STARR, CHANDLER D.	W. 86th st. and Riverside Drive, New York City.	June	4, 1884
STARR, WILLIAM H.	Supt. Trans. Erie Div. New York, Lake Erie and Western R. R., Jersey City, N. J.	April	2, 1884
STEWART, HUNTER	Morris Bldg., New Orleans, La.	June	1, 1881
STEWART, WILLIAM JAMES	First Asst. City Surveyor, 16 City Hall, Rochester, N. Y.	May	7, 1890
STITES, ARCHER C.	Asst. to J. A. L. Waddell, Keith & Perry Bldg., Kansas City, Mo.	Dec.	3, 1890
ST. JOHN, RICHARD C.	Civil Eng., Princeton, N. J.	Oct.	1, 1890
TALLON, JOHN J.	Asst. Eng., N. H. Co. Ry., 70 7th st., Hoboken, N. J.	Sept.	3, 1890
TAPPAN, ROGER	34 W. Cedar st., Boston, Mass.	Dec.	3, 1884
TEMPLE, J. FRED.	Ch. Draftsman, San Francisco, Bridge Co., Seattle, Wash.	Feb.	5, 1890
TENNEY, GEORGE O.	Eng. and Contractor, P. O. Box 223, New Decatur, Ala.	Sept.	7, 1887
THOMPSON, CLARK W.	Orchard pl., La Crosse, Wis.	Mar.	5, 1890
TIBBALS, GEORGE A.	148 Milton st., Brooklyn, N. Y.	May	2, 1888
TIBBALS, SAMUEL G.	148 Milton st., Brooklyn, N. Y.	May	2, 1888
TITUS, WALTON O.	P. O. Box 124, Eagle Pass, Texas.	April	7, 1886
TREADWELL, LEE	Eng. in Chg., Pacific Short Line Bridge, Sioux City, Iowa.	Nov.	5, 1890
TRIBUS, LOUIS L.	Asst. Eng., Plainfield Water Supply, 84 Warren st., New York City.	April	4, 1888
TRIST, WOLFGANG G.	Prin. Asst. to A. P. Boller, 71 Broadway, New York City.	Sept.	3, 1890
TROTTER, ALFRED W.	112 East 127th st., New York City.	Sept.	5, 1883
TROWBRIDGE, FRANCIS C.	Draftsman, Black & Clawson Co., Hamilton, Ohio.	Dec.	4, 1889



Name.	Address.	Date of Membership.
TUCKER, WILLIAM C.	109 East 16th st., New York City.	May 5, 1891
TUTHILL, JOB	Bridge Eng., C. & W. M. Ry. and D. L. & N. R. R., Grand Rapids, Mich.	June 6, 1888
TUTTLE, ARTHUR S.	Asst. Eng. Dept. City Works, Mu- nicipal Bldg., Brooklyn, N. Y.	March 2, 1887
TYRRELL, HENRY G.	Pencoyd Bridge & Cons. Co., Pen- coyd, Pa.	Feb. 5, 1890
VAN ZILE, HARRY L.	55 North Pearl st., Albany, N. Y.	Jan. 6, 1886
VAUGHAN, GEORGE W.	Div. Eng. Eastern Div. New York, Chicago & St. Louis Ry., Broadway Depot, Cleveland, Ohio.	March 3, 1886
VAUX, DOWNING	Bible House, Astor pl., New York City.	Nov. 2, 1887
VIELÉ, MAURICE A.	Asst. Eng. Aqueduct Comm., 324 St. Nicholas ave., New York City.	Feb. 4, 1891
VIER, HENRY	Asst. Eng. N. Y. C. & H. R. R. R., Rochester, N. Y.	Dec. 4, 1889
VILLALON, JOSÉ R.	Res. Eng. Spanish Am. Iron Co., Santiago, Cuba.	July 4, 1888
WADA, YOSHICHIKA	Ch. Eng. Tiku-Ho Ry., Nogata Kurata-gun, Fukuoka-Ker, Japan.	Sept. 7, 1887
WADDELL, MONTGOMERY	The Waddell-Entz Electric Co., Bridgeport, Conn.	Sept. 1, 1886
WARNER, CHARLES S.	132 Broadway, New York City.	Jan. 2, 1889
WATSON, THOMAS T.	Losey House, Morristown, N. J.	Feb. 5, 1890
WHEATLEY, ARTHUR C.	Asst. Eng. Mexican Pacific Ry., San Juan Bautista, Tabasco, Mexico.	May 7, 1890
WHEATLEY, JOSEPH Y.	Asst. Eng. New York Central & Hudson River R. R., Grand Central Station, Room 21, New York City.	June 1, 1887
WHEELER, HARRY R.	Eng. in chg. Tunnel, etc., N. Y., Ont. & W. Ry., Walton, N. Y.	April 4, 1888
WHITTEMORE, WALTER F.	439 Garden st., Hoboken, N. J.	March 6, 1889
WILLIAMS, WILLIAM P.	Eng. Nicholson Elec. Hoist'g & Conveying Mach. Co., P. O. Box 147, Cleveland, Ohio.	May 4, 1887
WILLSON, FREDK. NEWTON	Prof. of Descriptive Geometry, Stereotomy and Technical Drawing in the John C. Green School of Science, Princeton, N. J.	Sept. 5, 1883

## JUNIORS.

Name.	Address.	Date of Membership.
WILSON, FRANK WALTER	Gen. Agt. King Bridge Co., 1105 E. Main st., Richmond, Va.	May 5, 1891
WOOD, ARTHUR H.	Surveyor San Diego Land & Town Co., National City, Cal.	March 31, 1891
WOOD, CHARLES FRANCIS	Eng. and Supt. Knoxville Water Co., Knoxville, Tenn.	Dec. 5, 1888
WOOD, IRVING S.	City Eng. office, Providence, R. I.	March 5, 1890
YATES, PRESTON K.	Gen. Insp. 155th st. Viaduct, 236 West 55th st., New York City.	June 6, 1883
YEATMAN, HENRY C.	Coahuila Coal Co., San Felipe, Coahuila, Mexico.	May 7, 1890
YORK, HERBERT W.	Cons. Eng., 22 Cortlandt st., New York City.	May 2, 1888
YOUNG, HERBERT A.	Secy. to Asst. Man. Mexican Central Ry., Mexico, Mexico.	May 7, 1884
ZABRISKIE, AARON J.	104 Sherman ave., Newark, N. J.	July 1, 1885
ZELLER, ALBERT H.	Asst. Eng. Edge Moor Bridge Works, Wilmington, Del.	May 7, 1890

JUNIORS, 223.

## FELLOWS.

[F. Am. Soc. C. E.]

Name.	Address.	Date of Membership.
ADAMS, EDWARD DEAN	17 Nassau st., New York City.	March 31, 1891
AINSLIE, JAMES W.	Louisville, Ky.	May 28, 1872
ALBRIGHT, JOHN J.	Buffalo, N. Y.	April 20, 1886
BARBER, AMZI LORENZO	Pres. The Barber Asphalt Paving Co., 1 Broadway, New York City.	March 19, 1886
BATTERSON, J. G.	Pres. Travelers' Insurance Co., Hartford, Conn.	June 7, 1876
BELKNAP, WILLIAM R.	115 West Main st., Louisville, Ky.	May 28, 1872
BLATCHFORD, E. W.	375 La Salle ave., Chicago, Ill.	Feb. 6, 1873
BOUTON, NATHANIEL S.	Pres. Bouton & Co., Chicago, Ill.	Dec. 30, 1872
BRIDGFORD, JOHN	Albany, N. Y.	Jan. 14, 1871
CHANUTE, OCTAVE*	(President.) Cons. Eng., 5 Ritchie pl., Chicago, Ill.	July 11, 1872

\* Member.

Name.	Address.	Date of Membership.
CHENEY, NATHANIEL	(Cheney & Hewlett), Iron Works, 100 Rodney st., Brooklyn, N. Y.	June 21, 1870
CLARK, EDWARD W.	139 South 4th st., Philadelphia, Pa.	April 8, 1870
CLARKE, THOMAS C.*	1 Broadway, New York City.	May 20, 1872
CLEMENT, VICTOR M.	Gen. Man. Bunker Hill & Sullivan M. & C. Co., Wardner, Idaho.	Jan. 8, 1890
COCHRAN, A. P.	Louisville, Ky.	June 19, 1872
COIT, EDWARD W.	Local Man. National Tube Works, 938 N. 2d st., St. Louis, Mo.	Sept. 20, 1872
COLBY, CHARLES L.	Pres. St. Paul & Northern Pacific R. R., 3 East 69th st., New York City.	July 31, 1883
COLEMAN, T. C.	252 W. Main st., Louisville, Ky.	May 28, 1872
CONRO, ALBERT	Milwaukee, Wis.	June 13, 1883
COOPER, EDWARD	17 Burling Slip, New York City.	Dec. 10, 1885
DARWIN, HARRY G.	Asst. Eng. Safety Car Heating and Lighting Co., 160 Broadway, Room 18, New York City.	March 22, 1887
DE GARAY, FRANCISCO	Prof. School of Engineers, la Calle de la Independencia, No. 11 Mexico, Mexico.	Aug. 31, 1883
DILLON, SIDNEY	42 Wall st., New York City.	March 26, 1870
DIVEN, ALEXANDER S.	Elmira, N. Y.	June 16, 1870
DU PONT, BIDERMAN	Louisville, Ky.	Sept. 5, 1873
FARREN, B. N.	Montague City, Mass.	March 12, 1870
FINK, ALBERT*	(Past-President.) Louisville, Ky.	Sept. 3, 1872
FLINT, CHARLES R.	Flint & Co., 152 Pearl st. (Resi- dence, 4 East 36th st.), New York City.	June 7, 1876
FRANCIS, JAMES B.*	(Past-President.) Cons. Eng. Proprs. of Locks and Canals on Merrimack River, Lowell, Mass.	May 4, 1870
GILMAN, CHARLES C.	Pres. The International Terra Cotta Lumber Co., 115 Dearborn st., Chicago, Ill.	May 11, 1871
GREEN, SAMUEL M.	R. R. Contractor, 81 New Insur- ance Bldg., Milwaukee, Wis.	Sept. 5, 1888
GURNEE, WALTER S.	7 Nassau st., New York City.	May 10, 1870
HARRISON, STEPHEN A.	81 New Insurance Bldg., Milwau- kee, Wis.	Jan. 30, 1873
HILL, JAMES J.	Pres. Great Northern Ry., St. Paul, Minn.	Jan. 10, 1889
HOLMAN, STEPHEN	Treas. Holyoke Machine Co., Wor- cester, Mass.	July 11, 1872
HOWLAND, GEORGE, Jr.	New Bedford, Mass.	June 6, 1870

Name.	Address.	Date of Membership.
HUNTINGTON, COLLIS P.	Pres. Southern Pacific R. R., 23 Broad st., New York City.	March 10, 1877
JONES, BENJAMIN F.	Pittsburgh, Pa.	June 15, 1870
JOY, JAMES F.	Detroit, Mich.	Nov. 6, 1872
LONG, DENNIS	Louisville, Ky.	March 28, 1872
MERRITT, GEORGE	131 William st., New York City.	May 6, 1870
MEYER, HENRY C.	Editor and Proprietor <i>The Engineering Record</i> , 277 Pearl st., New York City.	Oct. 22, 1885
NORMAN, GEORGE H.*	Newport, R. I.	March 23, 1870
NORTON, FREDERICK O.	92 Broadway, New York City.	June 4, 1879
PROSSER, THOMAS	15 Gold st., New York City.	June 1, 1870
REED, WILLIAM W.	Pres. Erie City Pass. Ry., Erie, Pa.	Dec. 20, 1872
RICHMOND, HENRY A.	Buffalo, N. Y.	July 7, 1870
RUMSEY, B. C.	Buffalo, N. Y.	May 12, 1870
SCOTT, WILLIAM L.	Erie, Pa.	July 7, 1870
SWIFT, McREE	New Brunswick, N. J.	March 9, 1870
TASKER, STEPHEN P. M.	Mech. Eng., 1622 South 5th st., Philadelphia, Pa.	Sept. 20, 1872
TAYLOR, WILLIAM J.	Gen. Man. Taylor Iron and Steel Co., High Bridge, N. J.	May 10, 1870
TOUCEY, JOHN M.	Gen. Supt. New York Central & Hudson River R. R., Grand Central Station, New York.	May 17, 1870
WALKER, GEORGE C.	228 Michigan ave., Chicago, Ill.	Feb. 6, 1873
WATSON, JAMES	Paterson, N. J.	Dec. 5, 1872
WELTON, NELSON J.	Civil Engineer, Waterbury, Conn.	Jan. 20, 1873

FELLOWS, 56.

## RECAPITULATION, AUGUST 31, 1891.

Honorary Members.....	6
Corresponding Members.....	3
Members.....	1 110
Associate Members.....	25
Associates.....	69
Juniors.....	223
Fellows (not Members).....	51
Subscribers to the Building Fund not otherwise connected with the Society.....	37
Total.....	1 524

\* Member.

## GEOGRAPHICAL DISTRIBUTION.

---

### UNITED STATES.

#### ALABAMA.

MEMBERS.—*Huntsville*—Arthur Owen Wilson; *Montgomery*—Chambers McKibbin Craig, Philip M. Price; *Wheeler*—Wm. Garnett Williamson.

ASSOCIATE MEMBER.—*Birmingham*—John F. Healy.

ASSOCIATE.—*Mobile*—Thomas W. Nicol.

JUNIORS.—*New Decatur*—George O. Tenney; *Tuscaloosa*—Richard C. McCalla.

#### ARIZONA.

MEMBERS.—*Phoenix*—Cornelius S. Masten; *Tombstone*—Julius H. Striedinger; *Yuma*—Achilles W. Unthank.

#### ARKANSAS.

MEMBERS.—*Little Rock*—Rudolph Fink, Fred. J. H. Rickon.

JUNIORS.—*Camden*—James H. Fuertes; *Pine Bluff*—Walter H. Gahagan.

#### CALIFORNIA.

MEMBERS.—*Coronado*—Robert B. Stanton; *Los Angeles*—Frederick Eaton, Patrick J. Flynn, Wilbur F. McClure, Edward T. Wright; *Mare Island*—Frank O. Maxson, Christopher C. Wolcott; *National City*—Francis E. Prendergast; *Oakland*—Louis J. LeConte; *Quincy*—James E. Mills; *Redlands*—Willard A. Nichols; *San Diego*—James D. Schuyler, Chalmers Scott, Thomas S. Sedgwick; *San Francisco*—William H. H. Benyaurd, Augustus J. Bowie, William G. Curtis, William R. Eckart, Horace D. Gates, William D. Gelette, George E. Gray, William Hammond Hall, William H. Heuer, John R. Hudson, Randell Hunt, Marsden Manson, George H. Mendell, S. Harrison Smith, William B. Storey, Jr., J. H. Wallace; *San Jose*—Henry A. Brainard; *Santa Barbara*—George F. Wright; *Santa Clara*—Charles E. Moore; *Tulare*—William C. Ambrose.

JUNIORS.—*Banning*—Edward M. Boggs, C. E. Fowler; *National City*—Arthur H. Wood; *Santa Barbara*—Ernest J. Purslow; *San Francisco*—William C. Edes.



## COLORADO.

MEMBERS.—*Colorado Springs*—John C. Bland; *Denver*—Herbert L. Aulls, Roswell E. Briggs, David C. Henny, Bruce F. House, Henry C. Jennings, Frank P. King, Edward C. Kinney, John H. Morton, George T. Nelles, Merritt H. Rogers, Alva M. Van Auken; *Leadville*—Thomas W. Jaycox; *Manitou*—Thomas F. Richardson; *Platoro*—Charles Ward Raymond; *Pueblo*—William A. Drake, Henry R. Holbrook; *Ridgway*—Charles W. Gibbs.

JUNIORS.—*Denver*—Frank E. Bissell, Archie Mc. L. Hawks; *Pueblo*—Friedrich Rosenberg.

## CONNECTICUT.

MEMBERS.—*Birmingham*—D. S. Brinsmade; *Bridgeport*—Henry Harding; *Danbury*—John W. Bacon; *East Berlin*—Burr K. Field, Charles M. Jarvis; *East River*—Samuel H. Chittenden; *Hartford*—Henry W. Ayres, George M. Bond, William B. Franklin; *Middletown*—George H. Bishop; *New Britain*—Thomas S. Bishop; *New Haven*—Frank Bruen, Fayette S. Curtis, Charles A. Ferry, Henry H. Gladding, Albert B. Hill, Cassius W. Kelly, Edward M. Reed; *Niantic*—R. M. Berrian; *Southington*—Theodore H. McKenzie; *Stamford*—Henry R. Towne; *Waterbury*—William W. Bonnett, Frank W. Whitlock.

ASSOCIATE MEMBER.—*Danbury*—James K. Wilkes.

JUNIORS.—*Bridgeport*—Montgomery Waddell; *Hartford*—Charles L. Burdett; *Meriden*—Stephen C. Pierson; *New Haven*—S. E. Barney, Jr., James P. Bogart, Henry L. Davis, A. J. Dubois, M. C. Hamilton, David C. Sanford; *South Manchester*—Lawrence B. Jenckes.

FELLOWS.—*Hartford*—J. G. Batterson; *Waterbury*—Nelson J. Welton.

## DELAWARE.

MEMBERS.—*Newark*—James R. Maxwell; *Wilmington*—Francis L. Hills, William Watkins Kenly, Henry G. Morse.

JUNIORS.—*Wilmington*—Francis H. Bainbridge, Albert H. Zeller.

## DISTRICT OF COLUMBIA.

HONORARY MEMBER.—*Washington*—Horatio G. Wright.

MEMBERS.—*Washington*—S. Thayer Abert, Charles B. Ball, Sumner H. Bodfish, John B. Dunklee, M. T. Endicott, O. H. Ernst, Francis R. Fava, Jr., William H. Grant, Bernard R. Green, William C. Gunnell, Peter C. Hains, Conway B. Hunt, James Loring Lusk, Henry L. Marindin, David E. McComb, A. G. Menocal, Alonzo T. Mosman, John A. Partridge, William S. Rosecrans, Herbert M. Wilson.

ASSOCIATE MEMBER.—*Georgetown*—David S. Carll.

ASSOCIATE.—*Washington*—J. Elfretth Watkins.

JUNIORS.—*Washington*—Owen L. Ingalls, James C. McGuire.

## FLORIDA.

MEMBERS.—*Fernandina*—Milnor P. Paret; *Jacksonville*—William B. Coffin, John Francis LeBaron; *Ocala*—Albon P. Man, Jr.; *St. Augustine*—William M. Black.

JUNIOR.—*Fort White*—Charles Herbert Deans.

## GEORGIA.

MEMBERS.—*Athens*—Robert H. Temple; *Atlanta*—Channing M. Bolton, Edwin A. Doane, Julien A. Hall, Hunter McDonald; *Cedartown*—George H. Clark; *Columbus*—W. H. McClintock; *Hapeville*—Edwin A. Doane; *Savannah*—Oberlin M. Carter, Wendell R. Curtis, Charles E. Marvin; Louis R. McLain; *Talbotton*—Arthur Pew; *Way Cross*—Henry W. Reed.

ASSOCIATE.—*Atlanta*—George H. Crafts.

JUNIORS.—*Atlanta*—Julius L. Adams; *Americus*—George G. Earl.

## IDAHO.

MEMBERS.—*Boise City*—Arthur D. Foote; *Idaho Falls*—Frank A. Calkins.

FELLOW.—*Wardner*—Victor M. Clement.

## ILLINOIS.

MEMBERS.—*Bloomington*—Charles Gleason Elliott; *Champaign*—Arthur N. Talbot; *Chicago*—William A. Aiken, Thomas Appleton, Samuel G. Artingstall, David L. Barnes, Charles J. Bates, Onward Bates, Edward J. Blake, Edward C. Carter, Octave Chanute, Elmer L. Corthell, Chester B. Davis, Frank C. Doran, Louis H. Evans, Roscoe E. Farnham, Bernhard Feind, Robert Forsyth, Emil Gerber, Abraham Gottlieb, Horace E. Horton, William M. Hughes, Robert W. Hunt, Moritz Lassig, Harry H. Latham, William H. Lotz, John Lundie, Charles MacRitchie, Robert J. McClure, George S. Morison, Charles J. Morse, John Newell, John Nichol, William R. Northway, Edwin G. Nourse, Henry W. Parkhurst, Edward F. Playle, Benjamin Reece, Albert F. Robinson, William Scherzer, Max E. Schmidt, Robert A. Shailer, E. C. Shankland, Robert I. Sloan, George C. Smith, Wm. Sooy Smith, Charles L. Strobel, John F. Wallace, Don J. Whittemore, Augustine W. Wright; *Chillicothe*—Alex. Edward Kastl; *E. St. Louis*—Henry F. Juengst; *Joliet*—Samuel B. Reed; *Milan*—L. L. Wheeler; *Quincy*—Edward Prince; *Rockford*—De Clermont Dunlap; *Rock Island*—Alexander Mackenzie.

ASSOCIATE MEMBERS.—*Chicago*—Theodore Starrett; *Rockford*—Daniel W. Mead.

ASSOCIATES.—*Chicago*—Joseph P. Card, William J. Karner, John H. Warder.

JUNIORS.—*Chicago*—Kennerley Bryan, William B. Ewing, Charles A. Hasbrouck, Wm. Chauncey Hawley, William A. Lydon, Corydon T. Purdy; *Peoria*—Eugene C. Carroll.

FELLOWS.—*Chicago*—E. W. Blatchford, Nathaniel S. Bouton, Charles C. Gilman, George C. Walker.

## INDIANA.

MEMBERS.—*Indianapolis*—Frank G. Darlington, Morris M. De Frees, George Watson Kittredge, M. W. Mansfield, Thomas O. Morris, Samuel H. Shearer; *Rising Sun*—Charles P. Yeatman; *Terre Haute*—Asa B. Fitch, George H. Simpson.

ASSOCIATE.—*Terre Haute*—Malverd A. Howe.

JUNIORS.—*Indianapolis*—Morton L. Byers, William C. Cushing, Edward T. McConnell; *Tolleston*—Edwin Duryea, Jr.

## INDIAN TERRITORY.

JUNIOR.—*Talequah*—William A. Illsley.

## IOWA.

MEMBERS.—*Cedar Rapids*—Henry F. White; *Council Bluffs*—Charles E. H. Campbell; *Davenport*—George H. Boynton; *Iowa City*—Charles D. Jameson; *Keokuk*—Montgomery Meigs; *Newton*—Danforth H. Ainsworth; *Sioux City*—Charles F. Powell.

JUNIORS.—*Burlington*—E. P. Butts; *Des Moines*—Charles W. McMeekin; *Sioux City*—Lee Treadwell.

## KANSAS.

MEMBERS.—*Argentine*—Augustus W. Boeke; *Cherokee*—Charles S. Henning; *Leavenworth*—Wallace McGrath, Alonzo J. Tullock, George W. Vaughn; *Salina*—Horace G. Johnston; *Scottsville*—Charles H. Sawyer; *Topeka*—Bernard F. Booker, James Dun, Emerson W. Grant, Howard V. Hinckley, Lewis Kingman, Charles D. Purdon, Albert A. Robinson, Samuel M. Rowe; *Wichita*—Howard H. Jackman.

ASSOCIATE.—*Kansas City*—Waterman Stone.

## KENTUCKY.

MEMBERS.—*Covington*—John W. Andrews, George B. Nicholson; *Crescent Hill*—James E. Willard; *Erlanger*—Cabell Breckenridge; *Earlington*—John B. Atkinson; *Louisa*—Benjamin F. Thomas; *Louisville*—William H. Courtenay, Frederick De Funiak, Albert Fink, James L. Frazier, Charles Herman, James M. Johnson, John MacLeod, Harry P. McDonald, Harry I. Miller, Richard Montfort, Marshall Morris, Thomas P. Shanks, Granville W. Shaw, Bushrod W. Taylor, Edwin Thacher; *Madisonville*—Charles Seymour; *Middlesborough*—Hart Vance.

ASSOCIATE.—*Louisville*—James B. Speed.

JUNIORS.—*Covington*—Clifford N. Miller; *Louisville*—O. E. Selby.

FELLOWS.—*Louisville*—James W. Ainslie, William R. Belknap, A. P. Cochran, T. C. Coleman, Dennis Long, Bidermann du Pont.

## LOUISIANA.

MEMBERS.—*New Orleans*—Benjamin M. Harrod, Sidney F. Lewis, Henry B. Richardson.

ASSOCIATE.—*New Orleans*—Joseph W. Putnam.

JUNIORS.—*Alexandria*—Edward L. Abbott; *New Orleans*—Hunter Stewart.

## MAINE.

MEMBERS.—*Bangor*—Thomas W. Baldwin, Wilson Crosby, Joseph N. Greene;  
*Kennebunk*—Sidney T. Fuller; *Portland*—William A. Allen, Francis S.  
 Burrowes, Edward C. Jordan, Jared A. Smith.

## MARYLAND.

MEMBERS.—*Baltimore*—John B. Bott, Mendes Cohen, Albert N. Connett, William P. Craighill, James G. Dagron, Henry T. Douglas, John E. Greiner, Francis H. Hambleton, George B. Hazlehurst, Charles H. Latrobe, L. S. Randolph, Frederick H. Smith, Thomas D. Whistler;  
*Frostburg*—Beverley S. Randolph; *Salisbury*—J. M. Jackson.

ASSOCIATE MEMBER.—*Baltimore*—Wm. Lee Sisson.

ASSOCIATE.—*Baltimore*—Clayton C. Hall.

JUNIORS.—*Baltimore*—Clinton L. Riggs, Arthur L. Shreve; *Hagerstown*—Edwin Mitchell.

## MASSACHUSETTS.

MEMBERS.—*Boston*—C. Frank Allen, David H. Andrews, Thomas Aspinwall, H. Bissell, Dexter Brackett, William H. Bradley, Frederick Brooks, Henry H. Carter, John E. Cheney, Eliot C. Clarke, S. Clarence Ellis, John R. Freeman, Joseph P. Frizell, Frank L. Fuller, Malcolm S. Greenough, Frank W. Hodgdon, Arthur Hodges, Gilbert Hodges, Edward W. Howe, Arthur H. Howland, William Jackson, Herbert C. Keith, George A. Kimball, Henry Manley, William E. McClintock, Thomas C. McCollom, George S. Morrill, Franklin C. Prindle, George S. Rice, L. Fred Rice, William Rotch, J. Parker Snow, Otto F. Sonne, Frederic P. Stearns, Charles H. Swan, Marshall M. Tidd, Joseph Veazie, Frank O. Whitney, Charles J. H. Woodbury; *Brockton*—E. L. Brown; *Brookline*—Desmond FitzGerald; *Cambridgeport*—Josiah G. Chase, Erasmus D. Leavitt, Joseph Whitney; *Charlestown*—Thomas Doane; *Fitchburg*—William H. Baker; *Gloucester*—Gorham P. Low; *Greenfield*—G. Clinton Gardner; *Holyoke*—Nathan H. Whitten; *Lawrence*—Richard A. Hale; *Lowell*—George E. Evans, James B. Francis; *Lynn*—Charles W. Gay; *Nantucket*—Henry Mitchell; *North Adams*—Augustus W. Locke; *Revere*—E. C. Appleton; *Sharon*—Edward S. Safford; *Somerville*—Charles D. Elliot, Wilbur F. Goodrich; *South Framingham*—Simpson C. Heald; *Springfield*—George N. Merrill, Mace Moulton; *Turner's Falls*—Charles W. Hazelton; *West Newton*—Albert F. Noyes; *Woburn*—Waldo E. Buck; *Worcester*—Charles A. Allen, George H. White.

ASSOCIATES.—*Boston*—Henry A. Phillips, Joseph R. Richards, George F. Swain, William Watson, Edward Wheaton, *Northampton*—Emory C. Davis; *Waltham*—William Roberts.

JUNIORS.—*Boston*—Ernest W. Bowditch, B. W. Guppy, G. F. Haynes, Roger Tappan.

FELLOWS.—*Montague City*—B. N. Farren; *New Bedford*—George Howland, Jr.; *Worcester*—Stephen Holman.

## MICHIGAN.

**MEMBERS.**—*Ann Arbor*—Charles E. Greene; *Benton Harbor*—James W. Pearl; *Coldwater*—Jacob A. Latcha; *Covert*—Henry M. Rood; *Detroit*—A. B. Atwater, Benj. Douglas, Charles P. Gilbert, James D. Hawks, D. Far-  
rand Henry, Frederick B. Howard, William Ludlow, Orlando M. Poe, Willard S. Pope, Julius W. Schaub, Arthur H. Scott, Charles W. Walton, Oscar F. Whitford, George Y. Wisner; *Escanaba*—Cornelius Palmer; *Grand Rapids*—James H. Covode, Frederick W. Lehnartz, John J. McVean; *Hancock*—George D. Emerson; *Houghton*—George A. Marr; *Jackson*—Robert M. Newman; *Kalamazoo*—George S. Pierson; *Marquette*—Horatio Seymour; *Sault Ste. Marie*—Ebenezer S. Wheeler.

**ASSOCIATE MEMBER.**—*Ann Arbor*—Fred Morley.

**ASSOCIATE.**—*Saginaw*—George L. Burrows.

**JUNIORS.**—*Ann Arbor*—Joseph B. Davis; *Detroit*—Elstner Fisher, John C. Moses, George E. Roehm, Job Tuthill; *Sault Ste. Marie*—Benno Roh-  
nert.

**FELLOW.**—*Detroit*—James F. Joy.

## MINNESOTA.

**MEMBERS.**—*Austin*—Francis W. Kimball; *Duluth*—Edward H. Keating; *Minneapolis*—Fred. A. Camp, George W. Cooley, John T. Fanning, Frederick N. Finney, Olaf Hoff, Elbert Nexsen, William A. Pike, Charles H. Prior, Watson W. Rich; *St. Cloud*—Frank H. Todd; *St. Paul*—Charles L. Annan, Robert B. C. Bement, Henry M. Byllesby, Walter W. Curtis, Harry W. Edwards, Howard N. Elmer, K. Emil Hilgard, John W. Kendrick, Charles F. Loweth, S. D. Mason, Charles J. A. Morris, A. Münster, Samuel Rockwell, Leonard W. Rundlett, Joseph S. Sewell, David C. Shepard, Horace E. Stevens, George L. Wilson.

**JUNIOR.**—*St. Paul*—John Blodgett.

**FELLOW.**—*St. Paul*—James J. Hill.

## MISSISSIPPI.

**MEMBERS.**—*Greenville*—Arthur Hider, Robert Somerville, William Starling; *Natchez*—Wm. Dunbar Jenkins; *Vicksburg*—Henry St. L. Coppée, Horace M. Marshall, Linton W. Stubbs.

## MISSOURI.

**MEMBERS.**—*Columbia*—Thomas Lafon; *Joplin*—William C. Wetherill; *Kansas City*—Daniel Bontecou, Timothy C. Bradley, Hiel H. Filley, Henry Goldmark, Joseph W. Hoover, W. Kiersted, Galen W. Pearsons, Frederick E. Sickels, John A. L. Waddell, Samuel H. Yonge; *Oakland*—Jacob Blickensderfer, Robert Blickensderfer; *St. Joseph*—S. Waters Fox, William F. Merrill; *St. Louis*—Holland W. Baker, Winthrop Bartlett, Anthony H. Blaisdell, Charles I. Brown, George Burnet, B. L. Crosby,



Daniel McN. Currie, Edward Flad, Henry Flad, Carl Gayler, William T. Gould, Edward A. Hermann, John F. Hinckley, M. L. Holman, John B. Johnson, Charles H. Ledlie, Thomas J. Long, William S. Lincoln, Robert E. McMath, Edward D. Meier, Charles V. Mersereau, Alexander M. Miller, Robert Moore, John A. Ockerson, George H. Pegram, Edward C. Rice, S. Bent Russell, Isaac A. Smith, Clinton F. Stephens, William N. Symington, Robert L. Van Sant, David W. Wellmann, Orlando B. Wheeler.

ASSOCIATES.—*St. Louis*—George C. W. Belcher, C. M. Woodward.

JUNIORS.—*Kansas City*—Edward Butts, Archer C. Stites; *Sibley*—Gilbert J. Bell; *St. Louis*—Julius Baier, George W. Cole, Sandford Horton, William W. Penney.

FELLOW.—*St. Louis*—Edward W. Coit.

### MONTANA.

MEMBERS.—*Butte*—Francis W. Blackford, Albert Bruce Knight, James MacFarlane, Nathaniel C. Ray, Elliott H. Wilson; *Great Falls*—Maurice S. Parker; *Helena*—William A. Haven; *Kalispell*—John A. B. Tompkins; *Marysville*—R. T. Bayliss, George H. Robinson.

JUNIOR.—*Butte*—George E. Moulthrop.

### NEBRASKA.

MEMBERS.—*Lincoln*—Edward Gillette, Jr.; *Omaha*—Andrew Rosewater.

### NEW HAMPSHIRE.

ASSOCIATES.—*Hanover*—Robert Fletcher, John V. Hazen.

### NEW JERSEY.

HONORARY MEMBER.—*Morristown*—George S. Greene.

MEMBERS.—*Bayonne*—William Rumble; *Bloomfield*—Charles H. Nash; *Bridgeton*—Oberlin Smith; *Camden*—Herbert C. Felton; *Elizabeth*—Jacob M. Clark, Francis Collingwood, James Moore; *Hackettstown*—George M. Rusling; *Hoboken*—Charles B. Brush, Thomas H. McCann, Gaylord Thompson; *Jersey City*—Edlow W. Harrison, James Moylan, John F. Ward, Lebbeus B. Ward; *Maplewood*—Gabriel Leverich; *Metuchen*—John W. Ferguson; *Morristown*—George W. Howell, Ralph G. Packard; *Newark*—Carrol Ph. Bassett, Gustav Lehlbach, James Owen, John S. Schaeffer, Eugene Vanderpool; *New Brunswick*—William E. Kelly; *Passaic*—Edmund L. B. Gardiner; *Paterson*—Reuben Shirreffs; *Plainfield*—R. Willard Ware; *Princeton*—Charles McMillan; *Rahway*—Charles R. Johnson; *Trenton*—Clark Fisher, Charles E. Hewitt.

ASSOCIATE MEMBER.—*Red Bank*—Thomas H. Grant.

ASSOCIATES.—*Bound Brook*—J. I. Livingston; *Jersey City*—H. Comer; *Schralenburg*—S. S. Bogart; *West Englewood*—C. W. Bradley.

**JUNIORS.**—*Elizabeth*—Charles B. Bonnett; *Hoboken*—Charles R. Bettes, John J. Tallon, Walter F. Whitemore; *Jersey City*—William E. Belknap, William H. Starr; *Morristown*—Thomas T. Watson; *Newark*—William P. Field, Aaron J. Zabriski; *Orange*—A. P. Folwell; *Paterson*—George H. Blakeley, St. John Clarke, Hugo S. Speidel; *Princeton*—Richard Collier, St. John, Frederick N. Willson; *South Orange*—Edward E. Magovern.

**FELLOWS.**—*High Bridge*—William J. Taylor; *New Brunswick*—McRee Swift; *Paterson*—James Watson.

## NEW MEXICO.

**MEMBER.**—*Eust Las Vegas*—R. D. Rowe.

**JUNIOR.**—*Albuquerque*—William F. Behrens.

## NEW YORK.

**HONORARY MEMBERS.**—*Brooklyn*—Julius W. Adams; *New York*—James C. Duane, John Newton.

**MEMBERS.**—*Albany*—Horace Andrews, George P. Hilton, James MacNaughton, Henry C. Parsons, Charles F. Stowell, Elnathan Sweet, Alexander J. Swift, Arthur S. C. Wurtele; *Brooklyn*—Peter C. Asserson, Oscar F. Balston, Frederick S. Benson, Van Brunt Bergen, L. Russell Clapp, Bentley D. Hasell, Warren E. Hill, Frank M. Leavitt, Gabriel Leverich, O. J. Marstrand, Charles C. Martin, Othniel F. Nichols, George W. Plympton, Samuel R. Probasco, Charles L. Rowland, Thomas F. Rowland, Thomas F. Rowland, Jr., George S. Skilton, Lucius A. Smith, Miller A. Smith, Robert Van Buren, Ignacio M. de Varona; *Buffalo*—George S. Field, Samuel J. Fields, George S. Gatchell, Edward B. Guthrie, Edmund Hayes, S. Munch Kielland, Paul S. King, Louis H. Knapp, George E. Mann, Charles H. McKee, Frank Nearing, T. Guilford Smith, Francis M. Wilder; *Caledonia*—Calvin E. Brodhead; *Carmel*—Alfred Craven; *Cherry Valley*—A. Beekman Cox; *Constableville*—Casimir Constable; *Cortland*—Charles Truesdell; *Elmira*—E. E. Buchanan, Charles Kellogg; *Fishkill*—John D. Fouquet; *Florida*—E. N. Kirk Talcott; *Geneseo*—John Young; *Geneva*—Charles T. Church, S. Fisher Morris; *Ithaca*—Estevan A. Fuertes, Robert H. Thurston; *Jamestown*—Edward C. Burns; *Kingston*—Edward B. Codwise; *Lansingburgh*—Joseph A. Powers, Nathaniel E. Russell; *Linoleumville*—David N. Melvin; *Long Island City*—P. D. Ford; *Middletown*—Edward Canfield, Lafayette Olney; *Mineville*—Samuel B. McKee; *Mohawk*—George I. Bailey; *Mt. Vernon*—Frederick S. Odell; *New Brighton*—Arthur J. Frith; *Newburgh*—John D. Van Buren; *New Rochelle*—Horace Crosby, Charles W. Hunt; *New York*—Job Abbott, Calvin H. Allen, Henry N. Babcock, William S. Bacot, Fred H. Baldwin, William J. Baldwin, Augustus P. Barnard, Oliver W. Barnes, Charles J. Bates, George S. Baxter, Leonard F. Beckwith, John A. Bensel, John Bogart, Virgil G. Bogue, Alfred P. Boller, W. H. Breithaupt, Josiah A. Briggs, Alex. G. Brinckerhoff, H. Waller Brinckerhoff, Charles O. Brown, Thomas E. Brown, Jr., Andrew Bryson, Carl W. Buchholz, Leffert L. Buck, William H. Burr, H. D. Bush, Allan

Campbell, James E. Childs, Benjamin S. Church, Jacob M. Clark, Thomas C. Clarke, Francis Collingwood, Cyrus B. Comstock, Theodore Cooper, George B. Cornell, J. James R. Croes, J. Foster Crowell, John Y. Culyer, Joseph P. Davis, Clarence Delafield, George Devin, S. L. F. Deyo, Pomeroy P. Dickinson, Edward B. Dorsey, H. F. Dunham, C. Wheeler Durham, Edward W. Eckert, Thomas Egleston, Charles E. Emery, Henry H. Farnum, Samuel M. Felton, Francis D. Fisher, J. Foster Flagg, M. N. Forney, John D. Fouquet, Alphonse Fteley, Eugene F. Fuller, Henry J. Gielow, Robert Gillham, E. Sherman Gould, Charles H. Graham, Benjamin D. Greene, Edward A. Greene, Francis V. Greene, George S. Greene, Jr., Stephen S. Haight, Henry S. Haines, William G. Hamilton, George E. Harding, George R. Hardy, Robert L. Harris, Bentley D. Hasell, William J. Haskins, Charles H. Haswell, Arthur Haviland, R. Somers Hayes, W. W. Hegeman, Rudolph Hering, Clemens Herschell, Sidney W. Hoag, Jr., John Houston, William R. Hutton, Charles E. Jackson, George A. Just, Walter Katté, Joseph M. Knap, Horace Loomis, Albert Lucius, Charles Macdonald, William W. Maclay, George B. Mallory, Daniel McCool, Thomas J. McMinn, George W. McNulty, Thomas C. Meyer, J. Imbrie Miller, Charles H. Myers, Charles E. Newham, Edward P. North, Joseph O. Osgood, John N. Ostrom, Frederick N. Owen, Arthur B. Paine, Charles Paine, Andrew McC. Parker, W. Barclay Parsons, Andrew J. Post, Levi W. Post, F. H. Prentiss, Henry G. Prout, Alfred L. Rives, Richard P. Rothwell, Thomas F. Rowland, William L. Saunders, Albert C. Savage, A. A. Schenck, Henry B. Seaman, Alfred H. Simpson, George F. Simpson, Frank W. Skinner, Albert M. Smith, D. Lowber Smith, Charles Sooy Smith, Julio F. Sorzano, Samuel Spencer, John H. Staats, Robert P. Staats, Charles W. Staniford, David McN. Stauffer, John M. Stewart, Cook Talcott, Joseph R. Thomas, Samuel C. Thompson, George H. Thomson, John Thomson, Alfred T. Tomlinson, Stevenson Towle, John G. Van Horne, Theodore Voorhees, William W. Walker, James R. Wardlaw, Frederick W. Watkins, Edward Wegmann, Jr., Samuel C. Weiskopf, Arthur M. Wellington, Schuyler S. Wheeler, W. Howard White, William H. Wiley, F. Stuart Williamson, William E. Worthen; *Niagara Falls*—William A. Brackenridge, George B. Burbank, Frank H. Clement, Benjamin Rhodes; *Oswego*—Wm. Pierson Judson, Charles D. Ward; *Port Henry*—William H. Searles; *Poughkeepsie*—John C. Patterson; *Purdy's Station*—Frank S. Washburn; *Rochester*—John F. Alden, Robert Cartwright, Edwin A. Fisher, William E. Hoyt, Emil Knichling, William N. Radenhurst, George W. Rafter, J. Nelson Tubbs; *Rome*—Charles C. Hopkins; *Schenectady*—J. Leland FitzGerald, William B. Landreth; *Sing Sing*—Charles S. Gowen, Edward Marsland, Evelyn P. Roberts; *Stillwater*—Ellis B. Noyes; *Syracuse*—H. Wadsworth Clarke, William B. Cogswell, Thomas P. Kinsley, Howard Soule, William A. Sweet; *Troy*—James A. Burden, David M. Greene, John P. Kelly, Palmer C. Ricketts; *Utica*—Richard W. Sherman; *Watkins*—Willard Beahan; *West New Brighton*—Martin Gay; *Wille's Point*—R. L. Hoxie; *Yonkers*—Wm. Henry Baldwin, Peter F. Brendlinger, Samuel L. Cooper.

ASSOCIATE MEMBERS.—*Long Island City*—William A. Cattell; *New York*—Levis P. Pennypacker, Edmund C. Stout, E. E. Russell Tratman, Clement I. Walker, Albert Lowry Webster; *Niagara Falls*—Albert H. Porter; *Rochester*—William F. Jordan; *Syracuse*—John M. Farley.

ASSOCIATES.—*Buffalo*—P. H. Griffin, Alan H. G. Hardwicke; *Greenbush*—Robert J. Pratt; *Ithaca*—Henry S. Jacoby; *New York*—Louis De Coppet Berg, Samuel S. Bogart, Henry R. Bradbury, C. W. Bradley, Jules Breuchaud, Alfred G. Compton, J. Woodbridge Davis, James R. Dunn, George H. Frost, William Gibson, Jr., John M. Goodell, Henry B. Hammond, Charles M. Harris, Leonidas M. Lawson, James F. Lewis, John Lockwood, Spencer Miller, William Churchill Oastler, Lewis R. Pomeroy, Calvin Tomkins; *Troy*—Frederick S. Young.

JUNIORS.—*Albany*—Norman B. Kellogg, Aug. S. Kibbe, Wainwright Parish, Harry L. Van Zile; *Brewster*—Walter McCulloh; *Brooklyn*—Norman S. Latham, Arthur S. Tuttle, George A. Tibbals, Samuel G. Tibbals; *Buffalo*—George A. Ricker, George R. Sikes; *Carmel*—William Gray; *Croton*—Harvey Farrington; *Elmira*—Horace J. Howe; *Greenpoint*—Charles B. Rowland; *Islip*—Engene R. Smith; *Ithaca*—Charles L. Crandall; *Malone*—George K. McCormick, George W. Sherwood; *Middletown*—Louis D. Fouquet, Charles H. Smith; *New Rochelle*—William B. Jewett; *New York*—Thomas W. Allen, Frederick N. Blanc, William C. Brown, J. Maxwell Carrere, E. H. Connor, J. N. Hayward Cornell, R. Walter Creuzbaur, Chandler Davis, Stancliff B. Downes, Walter L. Dusenberry, Carlos F. Ferrer, J. R. Furman, Russell W. Hildreth, John J. Hopper, Clifford S. Kelsey, Frank P. Lant, Frank D. H. Lawlor, Mario Lorini, E. B. Naylor, Charles F. Parker, J. C. L. Rogge, Maxwell Smith, John G. Spielman, Chandler D. Starr, William C. Tucker, Louis L. Tribus, Wolfgang G. Triest, Alfred W. Trotter, Maurice A. Vielé, Henry Vier, Downing Vaux, Charles S. Warner, Joseph Y. Wheatley, Preston K. Yates, Herbert W. York; *Poughkeepsie*—William F. Booth, Oscar Erlandsen, Thomas F. Lawlor; *Purdy's Station*—Edward E. de Lancey, Robert Ridgway, Ira A. Shaler; *Rochester*—Will E. Crane, Alfred M. Moss crop, Pemberton Smith, William James Stewart; *Rome*—Alexander Potter; *Syracuse*—Eugene Carroll; *Walton*—Harry R. Wheeler; *Yonkers*—Mario Lorini, Algernon S. Nye, Jr., Merritt H. Smith.

FELLOWS.—*Albany*—John Bridgford; *Brooklyn*—Nathaniel Cheney; *Buffalo*—John J. Albright, Henry A. Richmond, B. C. Rumsey; *Elmira*—Alexander S. Diven; *New York*—Edward Dean Adams, Amzi Lorenzo Barber, Charles L. Colby, Edward Cooper, Harry G. Darwin, Sidney Dillon, Charles R. Flint, Walter S. Gurnee, Collis P. Huntington, George Meritt, Henry C. Meyer, Frederick O. Norton, Thomas Prosser, John M. Toucey.

#### NORTH CAROLINA.

MEMBERS.—*Biltmore*—George R. Olney; *Chapel Hill*—William Cain; *Wilmington*—William H. Bixby.

JUNIORS.—*Beaufort*—W. H. Chadbourn, Jr.; *Biltmore*—James Berrall; *Southport*—Mark Fergusson.

## NORTH DAKOTA.

MEMBER.—*Grandin*—David W. Cunningham.

## OHIO.

MEMBERS.—*Akron*—Willis D. Chapman, John H. Sample; *Canton*—Edward J. Landor; *Cincinnati*—Truman H. Aldrich, Latham Anderson, William Archer, Ward Baldwin, John F. Barnard, C. C. F. Bent, Louis F. G. Bouscaren, Howard Breen, Robert L. Engle, John W. Hill, Lewis B. Jackson, Thomas D. Lovett, William E. Merrill, Charles Neilson, Joseph Ramsey, Jr., Robert L. Read, William B. Ruggles, Frederick C. Weir, Samuel Whinery; *Cleveland*—Clarence A. Carpenter, H. F. Dunham, Cyrus G. Force, John A. Fulton, Edward A. Handy, George H. Kimball, Marvin W. Kingsley, Benjamin F. Morse, Frank C. Osborn, Albert H. Porter, Walter P. Rice, James Ritchie, E. Tracy Scovill, Cady Staley, Charles H. Strong, John Whitelaw; *Columbus*—L. F. Fieser, Stillman W. Robinson, Christopher C. Waite; *Kelley's Island*—William D. Kelley, Jr.; *Ravenna*—De Witt C. Coolman; *Toledo*—Clifford Buxton, Christopher L. Gates, Arthur L. Mills, Charles A. Wilson; *Wellsville*—Lionor F. Loree; *Youngstown*—Walter L. Cowles; *Zanesville*—James K. Geddes.

ASSOCIATE MEMBER.—*Sleebenville*—George C. Urquhart.

ASSOCIATES.—*Cincinnati*—Frank W. Handy; *Cleveland*—H. W. King; *Hamilton*—Robert C. McKinney; *Youngstown*—Frank C. Lewis.

JUNIORS.—*Cincinnati*—Nathaniel O. Goldsmith, Francis W. Scarborough; *Cleveland*—William H. Stair, George W. Vaughan, William P. Williams; *Columbus*—C. Newton Brown; *Hamilton*—Francis C. Trowbridge; *Toledo*—Loomis E. Chapin, William G. Clark.

## OREGON.

MEMBERS.—*Cascade Locks*—Edward Burr; *Portland*—Bolton W. De Courcy, George L. Dillman, Franklin I. Fuller, J. Q. Jamieson, William H. Kennedy, Olaf R. Pihl, Albert S. Rifle, Franklin Rifle, Alfred F. Sears, Isaac W. Smith, William P. Watson.

## PENNSYLVANIA.

HONORARY MEMBER.—*Philadelphia*—Moncure Robinson.

MEMBERS.—*Allegheny City*—Charles Davis, Paul Didier, Arthur B. Starr; *Altoona*—Theodore N. Ely, Robert E. Pettitt; *Athens*—Charles Kellogg, Charles S. Maurice; *Beaver Falls*—Timothy S. White; *Bethlehem*—Mansfield Merriman; *Chambersburg*—Chauncey Ives; *Cheswick*—Alfred P. Kirtland; *Drifton*—Eckley B. Coxe; *Easton*—Frank Firmstone; *Erie*—John C. Quintus; *Hazleton*—Thomas S. McNair; *Johnstown*—George E. Thackray; *Latrobe*—G. Aertsen; *League Island*—Robert E. Peary; *New Brighton*—George M. Farley; *Norristown*—J. Milton Titlow; *Pencoyd*—James Christie, Rob B. Davis, Charles M. Mills; *Philadelphia*—Fred. J. Amweg, William S. Auchincloss, William F. Biddle, Maximilian F. Bonzano, Daniel P. Bruner, Thomas M. Cleeman, Oren B. Colton,



Charles G. Darrach, Joseph N. DuBarry, Louis P. Evans, Carl R. Grimm, Lewis M. Haupt, Washington Jones, Jacob H. Linville, D. Jones Lucas, Ulysses S. Lutz, Henry G. Morris, William J. Nicolls, Stacy B. Opdyke, Jr., Charles P. Perkins, Alfred Petry, Joseph D. Potts, William A. Pratt, Sutherland M. Prevost, David Reeves, B. Frank Richardson, Percival Roberts, Jr., Fairman Rogers, Albert J. Scherzer, Charles C. Schneider, Coleman Sellers, William Sellers, Samuel L. Smedley, Joseph S. Smith, Russell Thayer, Andrew D. Whitton, Edward H. Williams, Henry W. Wilson, John A. Wilson, Joseph M. Wilson; *Phillipsburg*—Camile S. d'Inwilliers; *Phoenixville*—Adolphus Bonzano, Amory Coffin, John Sterling Deans, Henry H. Quimby, Samuel Tobias Wagner; *Pittsburgh*—Frank M. Ashmead, Max J. Becker, Edward M. Bigelow, Charles Blackwell, Alba F. Brown, George H. Browne, Wm. W. Card, Charles Davis, George S. Davison, Alexander Dempster, Charles C. Elwell, J. G. Giaver, James H. Harlow, F. T. Hatch, Alfred E. Hunt, William H. Jennings, Thomas H. Johnson, Gustave Kaufman, Gustav Lindenthal, Nathan M. McDowell, William Metcalf, Reuben Miller, Samuel Rea, Thomas Rodd, Wm. Lucien Scaife, William P. Shinn, Felician Slataper, W. Harrison Smith, Edward B. Taylor, J. W. Walker, George Westinghouse, Jr., Wm. Glyde Wilkins, Joseph Wood; *Pottsville*—John N. Pott; *Reading*—Frank S. Stevens, A. Harvey Tyson; *Scottdale*—Kenneth Allen; *St. Mary's*—Sebastien Wimmer; *Scranton*—James Archbald, William M. Marple, William A. May, Charles C. Rose, J. Gardner Sanderson; *Sharpsville*—John M. Goodwin; *South Bethlehem*—H. Stanley Goodwin, William H. Jacques; *Steelton*—Charles E. Billin; *West Philadelphia*—George P. Bland; *Wilkesbarre*—Irving A. Stearns; *Williamsport*—Robert Neilson.

ASSOCIATE MEMBERS.—*Athens*—Ralph Modjeski; *Harrisburg*—F. C. H. Arentz; *Pencoyd*—Paul L. Wölfel.

ASSOCIATES.—*Chester*—Silas G. Comfort; *Johnstown*—Arthur J. Moxham; *Philadelphia*—William H. Barnes, George Burnham, Jr., Paul S. Reeves, John C. Trantwine, Jr.; *Pittsburgh*—William L. Abbott, Millard Hunsiker; *Steelton*—George W. Parsons; *Swarthmore*—Arthur Beardsley; *Swissvale*—Edward H. Goodman.

JUNIORS.—*Allentown*—Solomon J. Harwi; *Athens*—Alfred B. Ellsworth; *Cheltenham*—Casper W. Haines; *Osceola*—Thomas J. Brereton; *Pencoyd*—James B. French, Henry G. Tyrrell; *Philadelphia*—Robert C. Clarkson, William L. Ferguson; *Phoenixville*—Henry W. Hodge, Sinclair J. Johnson; *Pittsburgh*—Stewart Johnston; *Reading*—Edwin J. Beugler, W. W. Seitzinger; *South Bethlehem*—John E. Ostrander; *Steelton*—Mason Delano Pratt; *Swissvale*—George H. Paine; *Wilkesbarre*—Robert Van A. Norris.

FELLOWS.—*Erie*—William W. Reed, William L. Scott; *Philadelphia*—Edward W. Clark, Stephen P. M. Tasker; *Pittsburgh*—Benjamin F. Jones.

#### RHODE ISLAND.

MEMBERS.—*Chopmist*—James C. Aldrich; *Newport*—Joseph P. Cotton, William H. Lawton, Jr., George H. Norman; *Providence*—William D. Bullock,

Edwin P. Dawley, George B. Francis, Henry N. Francis, Samuel M. Gray, John T. Henthorn, Edmund D. Libby, J. Herbert Shedd, George C. Tingley, Edmund B. Weston; *Riverside*—James H. Armington.

ASSOCIATE.—*Newport*—Jacob B. Brown.

JUNIORS.—*Providence*—George H. Leland, P. S. Perkins, Elmer W. Ross, Irving S. Wood.

#### SOUTH CAROLINA.

MEMBERS.—*Charleston*—Frederic V. Abbott, James P. Allen, B. Burgh Smith.

JUNIOR.—*Sumter*—Curtiss Millard.

#### TENNESSEE.

MEMBERS.—*Chattanooga*—William C. Jewett, C. O. Parker, Benjamin Thompson; *Clarksville*—Robert L. Cobb; *Harriman*—Hood Tucker; *Johnson City*—William P. Harris, Gouv. Morris; *Memphis*—Niles Merriweather, Alfred Noble; *Nashville*—Wilbur F. Foster, Olin H. Landreth, Eugene C. Lewis, Charles A. Locke, Robert C. Morris, J. S. Walker; *Tullahoma*—Oliver H. P. Cornell.

JUNIORS.—*Knoxville*—Charles F. Wood; *Memphis*—Homer Reed Stanford.

#### TEXAS.

MEMBERS.—*Austin*—Joseph P. Frizell; *Eagle Pass*—Lorenzo M. Johnson; *Galveston*—Arthur J. Mason; *Houston*—Milton G. Howe; *San Antonio*—F. Weinagen; *Texarkana*—Howard G. Kelley.

JUNIORS.—*Eagle Pass*—Walton O. Titus; *Palestine*—Charles P. Matlack.

#### UTAH.

MEMBER.—*Milford*—John Q. Barlow.

JUNIOR.—*Ogden*—Arthur V. Abbott.

#### VIRGINIA.

MEMBERS.—*Cedar Bluff*—Emile Low; *Cobham*—George C. Dickinson; *Front Royal*—Foster Morss; *Houston*—Henry C. Derrick; *Lexington*—David C. Humphreys; *Richmond*—Decatur Axtell, Collinson P. E. Burgwyn, W. E. Cutshaw, William F. Dennis, T. C. Eggleston, Harry Frazier, A. Langstaff Johnston, E. T. D. Myers, Francis M. Rutherford, Thomas M. R. Talcott, Henry D. Whitcomb; *Roanoke*—Charles S. Churchill, William W. Coe, Oscar Saabye, George M. Tompson, Charles C. Wentworth; *Wytheville*—Charles R. Boyd.

ASSOCIATE.—*Crewe*—Edmund L. DuBarry,

JUNIORS.—*Richmond*—Rudolph P. Miller, E. T. D. Myers, Jr., Frank Walter Wilson; *Roanoke*—Robert A. Cummings.

#### WASHINGTON.

MEMBERS.—*Centralia*—Charles Harlowe; *Fairhaven*—John J. Donovan; *Seattle*—Frederick W. D. Holbrook, Henry K. Owens, William P. Watson,

Martinius Stixrud; *Snohomish*—John F. Stevens; *South Bend*—David D. Clarke; *Spokane*—Frederick J. Carrel; *Spokane Falls*—Henry A. Herrick; *Tacoma*—H. S. Huson, Norton L. Taylor; *Vancouver*—George A. Lederle.

ASSOCIATE MEMBER.—*Seattle*—Edwin Hall Warner.

JUNIORS.—*Seattle*—J. Fred. Temple; *Snohomish*—William B. Fuller, Sidney A. Parsons; *Tacoma*—Archie McL. Hawks.

#### WEST VIRGINIA.

MEMBERS.—*Charleston*—Addison M. Scott; *Clarksburg*—Thomas M. Jackson; *Kenova*—Walter A. Doane; *Morgantown*—Philip Golay; *Wheeling*—Norman W. Eayrs.

ASSOCIATE MEMBERS.—*Ceredo*—William D. Janney; *Kenova*—T. Kennard Thomson; *Nuthall*—Sigmund von Gemmingen.

#### WISCONSIN.

MEMBERS.—*Appleton*—Nathaniel M. Edwards, Thomas W. Orbison; *Babcock*—Rowland R. Minturn; *La Crosse*—Henry I. Bliss; *Milwaukee*—Jacob N. Barr, George H. Benzenberg, Charles E. L. B. Davis, Heliodore J. Hilbert, Charles J. Poetsch, Don J. Whittemore; *Oshkosh*—Horatio G. H. Read; *West Superior*—Joseph T. Dodge.

JUNIORS.—*La Crosse*—Clark W. Thompson; *Madison*—Allan D. Conover.

FELLOWS.—*Milwaukee*—Albert Conro, Samuel M. Green, Stephen A. Harrison.

#### WYOMING.

MEMBERS.—*Cheyenne*—Henry B. Patten; *Meeteetse*—William D. Pickett.

### NOT IN THE UNITED STATES.

#### ARGENTINE REPUBLIC.

MEMBER.—*Buenos Ayres*—Frank L. Griswold.

#### AUSTRALIA.

MEMBERS.—*New South Wales*: *Sidney*—George Downe, J. Walter Grimshaw, John A. McDonald, William H. Warren; *Queensland*: *Brisbane*—John B. Henderson, A. William Jardine; *Rockhampton*—Robert Ballard; *Victoria*: *Melbourne*—William C. Kernot, Henry C. Mais.

#### CANADA.

MEMBERS.—*British Columbia*: *Victoria*—Francis C. Gamble, George A. Keefer.

JUNIOR.—*British Columbia*: *Donald*—John Edgar Griffith.

MEMBERS.—*New Brunswick*: *Moncton*—Peter S. Archibald; *St. John*—Gilbert Murdoch; *St. Stephen*—David F. Maxwell; *Woodstock*—Moses Burpee.

JUNIOR.—*New Brunswick: Moncton*—William B. Mackenzie.

MEMBER.—*Nova Scotia: Amherst*—John F. O'Rourke.

MEMBERS.—*Ontario: Almonte*—Andrew Bell; *Brockville*—Willis Chipman; *Hamilton*—Joseph Hobson; *Napanee*—M. J. Butler; *Ottawa*—Sandford Fleming, Thomas C. Keefer, John L. P. O'Hanly, Robert Surtees; *Peterborough*—John G. Macklin; *Sault Ste. Marie*—William Crawford, William G. M. Thompson; *Toronto*—Charles E. Goad, Sir Casimir S. Gzowski, William T. Jennings.

ASSOCIATE.—*Ontario: Hamilton*—John S. Hendrie.

MEMBERS.—*Quebec: Montreal*—Alfred Brittain, Charles E. Goad, Edmund P. Hannaford, Herbert S. Holt, George T. Keith, Phelps Johnson, John Kennedy, Etienne H. Parent, P. Alex. Peterson, James Ross, James M. Shanley, William J. Sproule; *Quebec*—Alexander L. Light, Charles A. Scott.

#### CENTRAL AMERICA.

MEMBERS.—*Guatemala: Livingston*—Silvanus Miller; *Nicaragua: San Juan del Norte*—Frank P. Davis; *Salvador: La Union*—Oliver L. Glover.

#### CHILI.

MEMBERS.—*Santiago*—Franz Germann, Charles F. Hillman. *Valdivia*—Henry P. Bell; *Valparaiso*—Enrique Budge.

#### CHINA.

MEMBERS.—*Hong Kong*—James Orange; *Tientsin*—Claude William Kinder.

#### CUBA.

JUNIORS.—*Matanzas*—Ysidoro Polledo; *Santiago*—Eduardo J. Chibas, Jose R. Villalon.

#### ENGLAND.

CORRESPONDING MEMBER.—*London*—Sir Douglas Fox.

MEMBERS.—*Kent*—Hiram S. Maxim; *London*—William H. Booth, George Earl Church, Charles E. Goad, Robert Gordon, Thomas McKeown, James C. Post, Hamilton Smith, Jr., Ethelbert G. Woodford.

#### EGYPT.

JUNIOR.—*Port Tewfik*—Edgar B. Gosling.

#### FRANCE.

CORRESPONDING MEMBER.—*Paris*—Ernest Pontzen.

MEMBER.—*Paris*—Edgar B. Van Winkle.

#### GERMANY.

CORRESPONDING MEMBER.—*Hamburg*—Charles O. Gleim.

MEMBERS.—*Baden*—Edward Hemberle; *Frankfurt*—Robert Bassel; *Prussia: Essen*—O. C. E. Budde; *Wuerzburg*—Francis Rinecker.

## INDIA.

MEMBER.—*Punjab: Simla*—Edward H. Stone.

JUNIOR.—*Punjab: Simla*—R. Allan Blunt.

## JAPAN.

MEMBER.—*Tokio*—Mitsugu Sengoku.

ASSOCIATE.—*Kobe*—Kiosaburo Futami.

JUNIORS.—*Fukuoka-ken*—Yoshichika Wada; *Tokio*—Kayajiro Kobayashi, Tora-goro Kondo; *Yokohama*—Harold E. de Raasloff.

## MEXICO.

MEMBERS.—*Colima*—Arthur P. Herbert; *Guaymas*—H. Tudor Richards; *Mexico*—Henry W. Potter; *Monterey*—Francis E. Butterfield, William H. Wentworth; *Tabasco: San Juan Bautista*—Samuel Killebrew; *Tehuacan*—John E. Earley; *Puebla: Tepeyahualco*—Allen B. Hegeman; *Tampico*—Arthur F. Wrotnowski.

JUNIORS.—*Baja California: La Paz*—Alfred Rosenweig; *Corralitos*—Francis N. Holbrook; *Mexico*—Camilo E. Pani, Herbert A. Young; *Tabasco: San Juan Bautista*—Arthur C. Wheatley.

FELLOW.—*Mexico*—Francisco De Garay.

## PERU.

MEMBERS.—*Lima*—J. Howard Johnston, John L. Thorndike.

## SCOTLAND.

MEMBERS.—*Edinburgh*—James H. Cunningham; *Glasgow*—R. Morley Harison.

## SPAIN.

MEMBER.—*Barcelona*—Jose Tintorer y Giberga.

## UNITED STATES OF COLOMBIA.

MEMBERS.—*Baranquilla*—Francis J. Cisneros; *Cartagena*—J. M. Tobias; *Honda*—Norman J. Nichols; *Ibague*—Mirtiliano Sicard; *Panama*—Pedro J. Sosa.

## VENEZUELA.

MEMBER.—*Caracas*—Henry F. Rudloff.



## SUBSCRIBERS TO THE BUILDING FUND.

NOTE.—All contributions to the Building Fund are to be acknowledged from time to time by printing lists of the same in the monthly Proceedings of the Society, and, in addition to this, the names of all those who may subscribe \$100 or more are to be regularly enrolled and published in future lists of the Society, under the head of Subscribers to the Building Fund.

ANDREWS, HITCHCOCK & Co.....	109 Superior st., Cleveland, Ohio.
AYER, H. C.....	Care Manhattan Club, New York City.
BACON, JOHN W.....	Danbury, Conn.
BALLARD, ROBERT.....	Rockhampton, Queensland, Australia.
BARNARD, JOHN F.....	Pres. and Gen. Man. O. & M. R. R., Cincinnati, Ohio.
BELL, H. P.....	Valdivia, Chili.
BILLIN, CHARLES E.....	Penna. Steel Co., Steelton, Pa.
BLACKSTONE, T. B.....	President Chicago & Alton R. R., Chicago, Ill.
BOLLER, ALFRED P.....	71 Broadway, New York City.
BOSTON GAS LIGHT COMPANY.....	24 West st., Boston, Mass.
BOUSCAREN, G.....	Cons. Eng., Mitchell Bldg., Cincinnati, Ohio.
BOUTON, N. S.....	Chicago, Ill.
BOWEN, E. S.....	Gen. Man. R. W. & O. R. R., Oswego, N.Y.
BOYD, CHARLES R.....	Wytheville, Va.
BRIGGS, ROSWELL E.....	1439 William st., Denver, Colo.
BROOKS, FREDERICK.....	31 Milk st., Boston, Mass.
BROWN, ARTHUR.....	{ Supt. Bridges and Buildings Dept., C. P. R. R. and leased lines, West Oakland, Cal.
BROWN, CHARLES O.....	
	{ Pres. Riverside Bridge & Iron Works, 18 Broadway, New York City.
CABLE, R. R.....	Pres. C., R. I. & P. Ry., Chicago, Ill.
CARNEGIE, ANDREW.....	5 West 51st st., New York City.
CHAMBERLAIN, SELAH*.....	Cleveland, Ohio.
CHANUTE, A.....	Vice-Pres. Globe Smelting & Refining Co., Denver, Colo.
CHESBROUGH, E. S.*.....	Chicago, Ill.
CHISHOLM, WILLIAM.....	Pres. Cleveland Rolling Mill, Cleveland, Ohio.
CISNEROS, FRANCIS J.....	Barranquilla, U. S. Columbia.
CLARKE, REEVES & Co.....	Phoenixville, Pa.; 49 William st., New York City; 410 Walnut st., Philadelphia, Pa.
CLEVELAND CITY FORGE AND IRON Co.....	Cleveland, Ohio.
COLLINGWOOD, FRANCIS.....	Elizabeth, N. J.

\* Deceased.

COOPER, THEODORE.....	35 Broadway, New York City.
CORTHELL, ELMER L.....	205 La Salle st., Chicago, Ill.
CORYELL, MARTIN*.....	Lambertville, N. J.
COXE, ECKLEY B .....	Drifton, Pa.
CRERAR, JOHN*.....	Chicago, Ill.
CUNNINGHAM, JAMES H.....	4 Magdala Crescent, Edinburgh, Scotland.
DAVIS, JOSEPH P.....	113 W. 38th st., New York City.
DICKINSON, P. P.....	7 Nassau st., New York City.
DRAKE, JOHN H.....	71 Broadway, New York City.
DUNLAP, G. L.....	328 Dearborn ave., Chicago, Ill.
EADS, JAMES B.*.....	New York City.
ECKART, WILLIAM R.....	P. O. Box 1844, San Francisco, Cal.
EELLS, D. P.....	Pres. Commercial National Bank, Cleveland, Ohio.
EMERY, CHARLES E.....	22 Cortlandt st., New York City.
FARREN, B. N.....	Montague City, Mass.
FELTON, SAMUEL M.*.....	Pres. Penn. Steel Co., Philadelphia, Pa.
FINK, ALBERT.....	Louisville, Ky.
FISHER, CHARLES H.*.....	Lansingburg, N. Y.
FLINT, CHARLES R.....	142 Pearl st., New York City.
FRANCIS, JAMES B.....	{ Cons. Eng. Props. Locks and Canals. Merrimack River, Lowell, Mass.
GLOVER, OLIVER L.....	
GOODERHAM, W., JR.....	La Union, Salvador, Central America.
GOODRIDGE, JOHN C., JR.....	Toronto, Canada.
GOODRIDGE, JOHN C., JR.....	113 East 25th st., New York City.
GORRINGE, HENRY H.*.....	New York City.
GRAFF, FREDERIC*.....	Philadelphia, Pa.
HARRIS, HENRIQUE*.....	Brooklyn, N. Y.
HARRIS, WM. HAMILTON, Lt.-Col. U. S. A....	{ Pres. Bucyrus Steam Shovel & Dredge Co., 35 Wall st., New York City.
HASELL, BENTLEY D.....	
HAYES, R. SOMERS.....	66 Pine st., New York City.
HOLLEY, ALEXANDER L.*.....	32 Nassau st., New York City.
HORTON, SANDFORD.....	Brooklyn, N. Y.
HYDE, WILLIAM B.*.....	{ Care Supt. Pullman P. C. Co., Union Depot, St. Louis, Mo.
JERVIS, JOHN B.*.....	
KEEFER, THOMAS C....	Oakland, Cal.
KELLOGG, CHARLES.....	Rome, N. Y.
KEEFER, THOMAS C....	Ottawa, Canada.
KELLOGG, CHARLES.....	Athens, Pa.

LEAVITT, ERASMUS D.....	2 Central sq., Cambridgeport, Mass.
LEITH, ALEXANDER J.....	11 Pine st., New York City.
LEWIS, EUGENE C.....	Sycamore Powder Co., Nashville, Tenn.
MACDONALD, CHARLES.....	Union Bridge Co., 1 Broadway, New York City.
MAHER & BRAYTON.....	Cleveland, Ohio.
MAURICE, CHARLES S.....	Athens, Pa.
MAXWELL, JAMES R.....	Newark, Del.
McFADDEN, CHARLES.....	Andalusia, Bucks Co., Pa.
MELVIN, DAVID N.....	Linoleumville, Richmond Co., N. Y.
METCALF, WILLIAM.....	Crescent Steel Works, Pittsburgh, Pa.
NETTLETON, GEORGE H.....	{ Pres. and Gen. Man. K. C., F. S. & M. R. R., Kansas City, Mo.
NETTLETON, WILLIAM A.....	
NEUCHATEL ASPHALTE Co.....	265 Broadway, New York City.
NEWELL, JOHN.....	Pres. L. S. & M. S. Ry., Chicago, Ill.
NICHOLSON, GEORGE B.....	{ Ch. Eng. C., N. O. & T. P. Ry., 530 Garrard st., Covington, Ky.
NORMAN, GEORGE H.....	
NORTH, EDWARD P.....	{ (Care Am. Soc. C. E.), 127 East 23d st., New York City.
NORTON, F. O.....	
PAINÉ, WILLIAM H.*.....	New York City.
PAYNE, HENRY B.....	Cleveland, Ohio.
PERKINS, C. E.....	Pres. C. B. & Q. R. R., Burlington, Ia.
PHILBRICK, EDWARD S.*.....	Boston, Mass.
PORTER, H. H.....	{ Pres. C. & E. I. R. R.; Pres. C. & I. Coal Ry. Co., 311 Erie st., Chicago, Ill.
POTTER, O. W.....	
PRESCOTT, SCOTT & Co.....	P. O. Box 2128, San Francisco, Cal.
REED, EDWARD M.....	Vice-Pres. N. Y., N. H. & H. R. R., New Haven, Conn.
ROBERTS, W. MILNOR*.....	Rio de Janeiro, Brazil.
ROBINSON, A. A.....	Topeka, Kansas.
ROBINSON, MONCURE.....	Philadelphia, Pa.
ROTCH, WILLIAM.....	8 Exchange pl., Boston, Mass.
ROWLAND, THOMAS F.....	Continental Iron Works, Brooklyn, N. Y.
SICKLES, THEOPHILUS E.*.....	New York City.
SMITH, C. VANDERVOORT*.....	New York City.
SMITH, WILLIAM ALEXANDER.....	412 Madison ave., New York City.
SORZANO, JULIO F.....	33 Broadway, New York City.
STRANAHAN, J. S. T.....	Brooklyn, N. Y.
STOREY, WILLIAM B., JR. ....	4th and Townsend sts., San Francisco, Cal.
SWEET, WILLIAM A.....	Syracuse, N. Y.

SWIFT, McREE.....	New Brunswick, N. J.
SYKES, M. L.....	{ Vice-Pres., Treas. and Secy. Chicago & North Western Ry., 52 Wall st., New York City.
THAW, WILLIAM*.....	Pittsburgh, Pa.
TOD, JOHN.....	Cleveland, Ohio.
VAN WINKLE, EDGAR B.....	{ (Care Drexel Harjes & Co.), 31 Bd. Haussmann, Paris, France.
WADE, J. H.....	Pres. Nat. Bank of Commerce, Cleveland, Ohio.
WEIR, FREDERIC C.....	Burnett House, Cincinnati, Ohio.
WELCH, ASHBEL*.....	Lambertville, N. J.
WHIPPLE, SQUIRE*.....	Albany, N. Y.
WHITTEMORE, EUGENE.....	222 Biddle st., Milwaukee, Wis.

NOTE.—All the above subscriptions were devoted to the purchase and management of the House, No. 127 East 23d st., New York City.

---

LIST OF SUBSCRIBERS FOR ENLARGEMENT OF SOCIETY  
ACCOMMODATIONS, EITHER BY PROVIDING A  
NEW BUILDING OR BY ENLARGEMENT  
OF THE PRESENT HOUSE.

---

ADAMS, JULIUS W.....	155 Congress st., Brooklyn, N. Y.
ARCHBALD, JAMES..	Cons. Eng. D. L. & W. R. R., Scranton, Pa.
BATES, ONWARD.....	{ Eng. & Supt. Bridges and Bldgs., C. M. & St. P. Ry., Chicago, Ill.
BISSELL, FRANK E.....	Supt. N. M. Div. U. P. Ry., Denver, Colo.
BOGART, JOHN.....	71 Broadway, New York City.
BONZANO, ADOLPHUS.....	{ Vice-Pres. and Ch. Eng. The Phoenix Bridge Co., Phoenixville, Pa.
BRENDLINGER, PETER F.....	79 Warburton ave., Yonkers, N. Y.
BRUSH, CHARLES B.....	1 Newark st., Hoboken, N. J.
BRYSON, ANDREW.....	12 Broadway, Room 44, New York City.
CARD, JOSEPH P.....	{ Pres. Chicago Tie Preserving Co., 15th and Clark sts., Chicago, Ill.
CARD, WILLIAM W....	Secy. The Westinghouse Air Brake Co., Pittsburgh, Pa.
CHURCH, BENJAMIN S.....	54 West 12th st., New York City.
CLARKE, THOMAS C.....	1 Broadway, New York City.

CISNEROS, FRANCIS J.....	Baranquilla, U. S. Columbia.
COHEN, MENDES.....	825 N. Charles st., Baltimore, Md.
COLLINGWOOD, FRANCIS.....	Elizabeth, N. J.
COOPER, THEODORE.....	Civil & Mech. Eng., 35 Broadway, New York City.
CROES, J. JAMES R.....	Cons. Eng., 13 William st., New York City.
CROSBY, WILSON.....	125 Hammond st., Bangor, Me.
DARLINGTON, FRANK G.....	{ Supt. Ind. Div. P. C. C. & St. L. Ry., Indianapolis, Ind.
DAVIS, JOSEPH P.....	Cons. Eng., 113 West 38th st., New York City.
DICKINSON, POMEROY P.....	Cons. Eng., 7 Nassau st., New York City.
DORSEY, EDWARD BATES.....	{ (Care Am. Soc. C. E.), 127 E. 23d st., New York City.
DOWNES, STANCLIFF B.....	1071 Madison ave., New York City.
DUN, JAMES.....	Ch. Eng. A. T. & S. F. R. R., Topeka, Kans.
ECKERT, EDWARD W.....	34 West 38th st., New York City.
FANNING, JOHN T.....	Cons. Eng., Kasota Block, Minneapolis, Minn.
FLAGG, J. FOSTER.....	(Care Am. Soc. C. E.), 127 East 23d st., New York City.
FORSYTH, ROBERT.....	Ch. Eng., Ill. Steel Co., Chicago, Ill.
FROST, GEORGE H.....	{ Business Man. <i>Engineering News</i> , 105 Tribune Bldg., New York City.
GILMAN, CHARLES C.....	{ Pres. The International Terra Cotta Lumber Co., 115 Dearborn st., Chicago, Ill.
GOULD, E. SHERMAN.....	{ (Care Runkle, Smith & Co.), 15 Wall st., New York City.
GRAFF, FREDERICK*.....	Philadelphia, Pa.
GREENE, GEORGE S., JR.....	{ Eng.-in-Ch., Dept. Docks, Pier A, North River, New York City.
GRISWOLD, FRANK L.....	Cosmos Club, Buenos Ayres, Argentine Republic.
GUTHRIE, EDWARD B.....	Dep. City Eng., City Hall, Buffalo, N. Y.
HAIGHT, STEPHEN S.....	{ City Surveyor and Civil Eng., West Farms, New York City.
HAMILTON, WILLIAM G.....	105 East 21st st., New York City.
HAYES, EDMUND.....	Union Bridge Co., Buffalo, N. Y.
HILL, ALBERT B.....	City Eng., New Haven, Conn.
JOHNSON, CHARLES R.....	{ Pres. and Gen. Man. The Johnson R. R. Signal Co., Rahway, N. J.
JONES, WASHINGTON.....	1632 N. 15th st., Philadelphia, Pa.
KIRTLAND, ALFRED P....	Sec. and Treas. Marble Hill Quarry Co., Cheswick, Pa.
KNAP, JOSEPH M.....	365 West st., New York City.
LAWLER, JOHN*.....	Prairie du Chien, Wis.
LINDENTHAL, GUSTAV.....	Lewis Block, Pittsburgh, Pa.



MEYER, THOMAS C.....	11 Waverley pl., New York City.
MILLER, J. IMBRIE.....	(Care Am. Soc. C. E.), 127 E. 23d st., New York City.
MORSE, HENRY G.....	Pres. Edge Moor Bridge Works, Wilmington, Del.
MYERS, CHARLES H.....	63 Bleecker st., New York City.
NETTLETON, GEORGE H.....	{ Pres. and Gen. Man. K. C., F. S. & M. R. R., Kansas City, Mo.
NICHOLSON, GEORGE B.....	{ Ch. Eng. C., N. O. & T. P. Ry., 530 Garrard st., Covington, Ky.
ODELL, FREDERICK S.....	32 South 15th ave., Mt. Vernon, N. Y.
O'ROURKE, JOHN F.....	{ Eng. for Dawson, Symmes & Ussher, Contractors Chignecto Marine Transport Ry., Amherst, N. S.
PAINÉ, ARTHUR B.....	Windsor Hotel, New York City.
PAINÉ, CHARLES.....	71 Broadway, New York City.
PURDON, CHARLES D.....	Bridge Eng. A. T. & S. F. R. R., Topeka, Kans.
REA, SAMUEL.....	Box 198, Pittsburgh, Pa.
RICHARDS, JOSEPH R.....	44 Court st., Boston, Mass.
ROCKWELL, SAMUEL.....	Room 10, Davidson Block, St. Paul, Minn.
ROSS, JAMES.....	Windsor Hotel, Montreal, Canada.
ROBERTS, PERCIVAL, JR.....	261 South 4th st., Philadelphia, Pa.
ROBERTS, WILLIAM.....	Waltham, Mass.
ROWLAND, THOMAS F.....	Continental Iron Works, Brooklyn, N. Y.
SAMPLE, JOHN H.....	Ch. Eng. P. A. & W. R. R., Akron, Ohio.
SMITH, OBERLIN.....	Pres. Ferracute Machine Co., Bridgeton, N. J.
SMITH, T. GUILFORD.....	Chapin Block, Buffalo, N. Y.
SORZANO, JULIO F.....	33 Broadway, New York City.
SOSA, PEDRO J.....	Panama, U. S. Columbia.
STANTON, ROBERT B.....	Coronado, Cal.
STAUFFER, DAVID MCN.....	{ Editor <i>Engineering News</i> , Tribune Bldg., New York City.
STROBEL, CHARLES L.....	{ Ch. Eng. Keystone Bridge Co., 205 La Salle st., Chicago, Ill.
SYKES, M. L.....	{ Vice-Pres., Treas. and Secy. C. & N. W. Ry., 52 Wall st., New York City.
THOMSON, JOHN.....	212 Temple Court Bldg., New York City.
TIDD, MARSHALL M.....	10 Tremont st., Boston, Mass.
TOMKINS, CALVIN.....	150 Broadway, New York City.
TOWLE, STEVENSON.....	31 Chambers st., New York City.
WARDLAW, JAMES R.....	305 West 138th st., New York City.
WELLINGTON, ARTHUR M.....	{ Editor <i>Engineering News</i> , Tribune Bldg., New York City.
WHITTEMORE, DON J.....	Ch. Eng. C., M. & St. P. Ry., Chicago, Ill.
WILEY, WILLIAM H.....	53 East 10th st., New York City.
WORTHEN, WILLIAM E.....	63 Bleecker St., New York City.

# PAST OFFICERS

OF THE

## AMERICAN SOCIETY OF CIVIL ENGINEERS.

---

### PRESIDENTS.

JAMES LAURIE,\* November 5, 1852, to November 6, 1867.  
JAMES P. KIRKWOOD,\* November 6, 1867, to August 5, 1868.  
WILLIAM J. MCALPINE,\* August 5, 1868, to November 3, 1869.  
ALFRED W. CRAVEN,\* November 3, 1869, to November 1, 1871.  
HORATIO ALLEN,\* November 1, 1871, to November 5, 1873.  
JULIUS W. ADAMS, November 5, 1873, to November 3, 1875.  
GEORGE S. GREENE, November 3, 1875, to November 7, 1877.  
E. S. CHESBROUGH,\* November 7, 1877, to November 6, 1878.  
W. MILNOR ROBERTS,\* November 6, 1878, to November 5, 1879.  
ALBERT FINK, November 5, 1879, to November 3, 1880.  
JAMES B. FRANCIS, November 3, 1880, to January 18, 1882.  
ASHBEL WELCH,\* January 18, 1882, to September 25, 1882.†  
CHARLES PAINE, January 17, 1883, to January 16, 1884.  
DON J. WHITTEMORE, January 16, 1884, to January 21, 1885.  
FREDERIC GRAFF,\* January 21, 1885, to January 20, 1886.  
HENRY FLAD, January 20, 1886, to January 19, 1887.  
WILLIAM E. WORTHEN, January 19, 1887, to January 18, 1888.  
THOMAS C. KEEFER, January 18, 1888, to January 16, 1889.  
MAX J. BECKER, January 16, 1889, to January 15, 1890.  
WILLIAM P. SHINN, January 15, 1890, to January 21, 1891.  
O. CHANUTE, January 21, 1891.

### VICE-PRESIDENTS.

EDWARD GARDINER,\* November 5, 1852, to November 2, 1853.  
CHARLES W. COPELAND, November 5, 1852, to November 3, 1869.  
ALFRED W. CRAVEN,\* November 2, 1853, to November 6, 1867.  
JULIUS W. ADAMS, November 6, 1867, to November 5, 1873.  
JAMES B. FRANCIS, November 3, 1869, to November 2, 1870, and November 6, 1878, to November 3, 1880.  
THOMAS C. CLARKE, November 2, 1870, to November 1, 1871.  
JACOB M. CLARK, November 1, 1871, to November 5, 1873.  
W. MILNOR ROBERTS,\* November 5, 1873, to November 1, 1876.  
THEODORE G. ELLIS,\* November 5, 1873, to November 7, 1877.  
ALEXANDER L. HOLLEY,\* November 1, 1876, to November 7, 1877.  
ALBERT FINK, November 7, 1877, to November 5, 1879.

---

\* Deceased

† Mr. Ashbel Welch died September 25, 1882, during his term of office as President.



JAMES O. MORSE,*	years beginning Nov., 1853, to Nov., 1867, and Nov., 1876.		
J. W. PRATT,*	"	"	" 1853.
I. C. CHESBROUGH,*	"	"	" 1854, to Nov., 1867,
JAMES K. FORD,	"	"	" 1867, 1868.
GEORGE S. GREENE,	"	"	" 1867, 1868, 1870, 1872, 1874, 1876, 1877, 1878.
JOHN F. WARD,	"	"	" 1867, 1868, 1869, 1870, 1871.
E. S. CHESBROUGH,*	"	"	" 1869.
THOMAS PROSSER,*	"	"	" 1869.
JACOB M. CLARK,	"	"	" 1869, 1870.
THOMAS F. ROWLAND,	"	"	" 1870, 1871, 1872.
CHARLES MACDONALD,	"	"	" 1870, 1873, 1874.
ALFRED P. BOLLER,	"	"	" 1871.
WILLIAM E. WORTHEN,	"	"	" 1871.
JOHN BOGART,	"	"	" 1872, 1873, 1874.
F. COLLINGWOOD,	"	"	" 1872, 1873, 1874, 1875.
DE VOLSON WOOD,	"	"	" 1873.
O. CHANUTE,	"	"	" 1873, 1874, 1875, Jan., 1885.
A. L. HOLLEY,*	"	"	" 1875.
Q. A. GILLMORE,*	"	"	" 1875.
W. MILNOR ROBERTS,*	"	"	" 1876.
J. JAMES R. CROES,	"	"	" 1876.
WILLIAM H. PAINE,*	"	"	" 1876, 1877, 1878, 1879, 1880.
M. N. FORNEY,	"	"	" 1876.
JOSEPH P. DAVIS,	"	"	" 1877, 1880, Jan., 1882, 1883.
C. SHALER SMITH,*	"	"	" 1877.
C. VANDERVOORT SMITH,*	"	"	" 1877, 1878, 1879, 1880.
THOMAS C. CLARKE,	"	"	" 1878.
THEODORE G. ELLIS,*	"	"	" 1878.
CHARLES HERMANY,	"	"	" 1879.
EDGAR B. VAN WINKLE,	"	"	" 1879.
GOVERNEUR K. WARREN,*	"	"	" 1879.
G. BOUSCAREN,	"	"	" 1880.
D. J. WHITTEMORE,	"	"	" 1880.
THOMAS C. KEEFER,	"	"	Jan., 1882.
THOMAS L. CASEY,	"	"	" 1882.
GEORGE S. GREENE, JR.,	"	"	" 1882, 1883, 1884, 1886.
GEORGE W. DRESSER,*	"	"	" 1882.
WILLIAM METCALF,	"	"	" 1883, 1884.
WILLIAM E. MERRILL,	"	"	" 1883.
WILLIAM G. HAMILTON,	"	"	" 1883, 1887.
THEODORE COOPER,	"	"	" 1884, 1885.
FRED. GRAFF,*	"	"	" 1884.
WILLIAM R. HUTTON,	"	"	" 1884, 1885, 1886.
WALTER KATTÉ,	"	"	" 1885, 1889.
F. W. VAUGHAN,*	"	"	" 1885.
W. HOWARD WHITE,	"	"	" 1886.

HENRY G. MORRIS,	year beginning Nov.,	1886.
CHARLES L. STROBEL,	" "	" 1886.
CHARLES C. SCHNEIDER,	" "	" 1887.
STEVENSON TOWLE,	" "	" 1887, 1888.
JAMES ARCHBALD,	" "	" 1887.
ROBERT FORSYTH,	" "	" 1887.
MENDES COHEN,	" "	" 1888.
JOSEPH M. WILSON,	" "	" 1888.
CHARLES B. BRUSH,	" "	" 1888, 1889, 1890, 1891.
ALPHONSE FTELEY,	" "	" 1888.
ELIOT C. CLARKE,	" "	" 1889.
ROBERT E. McMATH,	" "	" 1889.
WILLIAM P. SHINN,	" "	" 1889.
THEODORE VOORHEES,	" "	" 1890.
ROBERT VAN BUREN,	" "	" 1890.
WILLIAM LUDLOW,	" "	" 1890.
WILLIAM G. CURTIS,	" "	" 1890.
RUDOLPH HERING,	" "	" 1891.
CLEMENS HERSCHEL,	" "	" 1891.
EDWARD P. NORTH,	" "	" 1891.
S. WHINERY,	" "	" 1891.



# American Society of Civil Engineers.

## DECEASED MEMBERS.

H. M., Honorary Member.    M., Member.    F., Fellow.    M. F., Member and Fellow.  
A., Associate.    J., Junior.

Name.	Class.	Residence.	Date of Membership.	Date of Death.
ABERT, J. J.	H. M.	Corps Engs. U.S.A.	Mar. 2, 1853.	Jan. 27, 1862
ACKENHEIL, CHARLES	M.	New York City.	Feb. 2, 1887.	June 20, 1890
AINSLIE, GEORGE	F.	Louisville, Ky.	May 28, 1872.	Sept. 7, 1878
ALLAIRE, WILLIAM M.	J.	New York City.	Mar. 2, 1881.	Dec. 14, 1884
ALLEN, HORATIO	H. M.	South Orange, N. J.	M. Dec. 4, 1867. H. M. Mar. 4, 1874.	Dec. 31, 1889
ALLEN, THEODORE	M.	South St. Louis, Mo.	Nov. 16, 1870.	Sept. 18, 1890
ALLIS, EDWARD P.	F.	Milwaukee, Wis.	Aug. 4, 1883.	Apr. 1, 1889
ANDERSON, ADNA	M.	Sing Sing, N. Y.	Sept. 2, 1874.	May 15, 1889
ANSLEY, GEORGE D.	M.	Montreal, Canada.	Sept. 4, 1878.	Sept. 22, 1883
ARTHUR, WILLIAM Y.	M. F.	Brooklyn, N. Y.	M. Dec. 4, 1867. F. Sept. 20, 1870.	Feb. 15, 1876
ASPINWALL, WM. H.	F.	New York City.	July 9, 1870.	Jan. 18, 1875
ATWOOD, WILLIAM H.	M.	Cleveland, Ohio.	May 4, 1881.	Sept. 4, 1890
AVERY, JOHN	M.	New York City.	Dec. 4, 1867.	Jan. 30, 1884
BACHE, ALEX. D.	H. M.	Washington, D. C.	Mar. 2, 1853.	Feb. 16, 1867
BAILEY, THOMAS N.	M.	Corps Eng. U.S.A.	Nov. 7, 1883.	Apr. 20, 1886
BAKER, WILLIAM L.	M.	Detroit, Mich.	J. Jan. 6, 1875. M. Nov. 6, 1878.	May 28, 1888
BARBOUR, WILLIAM S.	M.	Cambridgeport, Mass.	Apr. 17, 1872.	Feb. 24, 1889
BARNARD, JOHN G.	H. M.	Corps. Eng. U. S. A.	M. Sept. 15, 1869. H. M. Ap. 17, 1873.	May 14, 1882
BARNES, JAMES	M.	Springfield, Mass.	Mar. 13, 1853.	Feb. 12, 1869
BAUMANN, EDWARD	A.	Chicago, Ill.	June 2, 1880.	Jan. 23, 1889
BAYLEY, GEORGE W. R.	M.	New Orleans, La.	July 10, 1872.	Dec. 14, 1876
BELKNAP, MORRIS S.	M.	Louisville, Ky.	Aug. 7, 1872.	July 19, 1890
BELL, JAMES E.	M.	Cincinnati, Ohio.	Mar. 3, 1879.	June 8, 1879
BENTLEY, HENRY A.	M.	Newport, R. I.	Mar. 2, 1881.	May 13, 1889
BERESFORD, FRANK	J.	Cincinnati, Ohio.	Sept. 7, 1887.	Dec. 12, 1887
BLUNDEN, HENRY D.	M.	Athens, Pa.	J. Jan. 5, 1876. M. Feb. 4, 1880.	Jan. 7, 1889

Name.	Class.	Residence.	Date of Membership.	Date of Death.
BRIGGS, ALBERT D.	F.	Springfield, Mass.	May 17, 1870.	Feb. 20, 1881
BRIGGS, ROBERT	M.	Philadelphia, Pa.	Oct. 19, 1870.	July 24, 1882
BROUGH, REDMOND J.	M.	Toronto, Canada.	Sept. 1, 1880.	July 21, 1883
BROWN, JOHN M.	M.	Auburn, N. Y.	Apr. 1, 1874.	June 16, 1874
BUCKHOUT, ISAAC C.	M.	New York City.	July 10, 1872.	Sept. 27, 1874
BURDEN, HENRY	H. M.	Troy, N. Y.	Mar. 28, 1853.	Jan. 19, 1871
BURR, JAMES D.	M.	Topeka, Kansas.	Apr. 5, 1876.	May 5, 1886
CAMP, JONATHAN, JR.	M.	Jersey City, N. J.	July 2, 1873.	Apr. 16, 1874
CARTWRIGHT, HENRY	M.	Philadelphia, Pa.	Sept. 6, 1876.	July 30, 1881
CARY, EDGAR S.	M.	Newburgh, N. Y.	Nov. 1, 1882.	Jan. 5, 1883
CASS, GEORGE W.	F.	New York City.	Mar. 30, 1871.	Mar. 21, 1888
CHASE, S. STEWART	F.	Holyoke, Mass.	Dec. 8, 1868.	May 29, 1873
CHESBROUGH, E. S.	M.	Chicago, Ill.	June 17, 1868.	Aug. 18, 1886
CLARK, IRA E.	J.	San Francisco, Cal.	Feb. 6, 1878.	May 23, 1882
COLBURN, WARREN	M.	Toledo, Ohio.	Mar. 18, 1868.	Sept. 16, 1879
COLBURN, ZERAH	M.	London, England.	Jan. 5, 1855.	Apr. 26, 1870
COLMAN, ISAAC D.	M.	New York City.	Feb. 17, 1869.	Apr. 8, 1875
CONNOR, ADDISON	M.	New York City.	Jan. 5, 1887.	Jan. 4, 1891
COOKE, ROBERT L.	M.	New York City.	Apr. 17, 1872.	Aug. 11, 1877
CORYELL, MARTIN	M.	Lambertville, N. J.	Dec. 4, 1867.	Nov. 30, 1886
COURTWRIGHT, MILTON	F.	New York City.	June 11, 1870.	Apr. 25, 1883
Craven, ALFRED W.	M.	New York City.	Nov. 5, 1852.	Mar. 27, 1879
Craven, HENRY S.	M.	New York.	Dec. 5, 1884.	Dec. 7, 1889
CUSHING, OLIVER E.	M.	Lowell, Mass.	July 10, 1872.	Jan. 17, 1890
CUSHING, SAMUEL B.	M.	Providence, R. I.	Sept. 15, 1869.	July 17, 1873
CUSHING, SAMUEL B.	M.	Providence, R. I.	June 1, 1887.	Dec. 3, 1888
DAVIDSON, MATTHIAS O.	M.	New York City.	Apr. 6, 1853.	Sept. 1, 1872
DEARBORN, WILLIAM L.	M.	New York City.	Dec. 4, 1867.	Mar. 15, 1875
DERBISHIRE, STEWART	M.	Ottawa, Canada.	Apr. 2, 1884.	Jan. 7, 1887
DEXTER, GEORGE M.	M.	Boston, Mass.	Nov. 5, 1852.	Nov. 26, 1872
DIRKS, JUSTUS	H. M.	The Hague, Holl'd.	June 2, 1880.	Dec. 26, 1886
DRESSER, GEORGE W.	M.	New York City.	July 5, 1876.	Mar. 27, 1883
DURANT, THOMAS C.	F.	New York City.	Nov. 18, 1870.	Oct. 5, 1885
EADS, JAMES B.	M. F.	New York City	{ M. Dec. 16, 1868. { F. Mar. 30, 1870. }	{ Mar. 8, 1887
EDGE, GEORGE W.	M.	Jersey City, N. J.	Mar. 4, 1874.	Jan. 1, 1880
ELLIOTT, GEORGE H.	M.	Norfolk, Va.	Apr. 4, 1883.	Oct. 7, 1886
ELLIS, NATHANIEL W.	M.	Manchester, N. H.	Feb. 2, 1881.	Jan. 16, 1889
ELLIS, THEODORE G.	M. F.	{ Hartford, { Conn.	{ M. Feb. 17, 1869. { F. Nov. 21, 1872. }	{ Jan. 9, 1883
EMACK, CHARLES S.	M.	Culpeper, Va.	July 6, 1870.	July 27, 1877
EMMETT, THOMAS A.	M.	Carmel, N. Y.	Nov. 5, 1852.	Jan. 12, 1880
EMONTS, WM. A. G.	J.	Reading, Pa.	Sept. 6, 1876.	Nov. 5, 1887
ENSIGN, ELISHA W.	F.	Buffalo, N. Y.	May 18, 1870.	Oct. 1, 1877

Name.	Class.	Residence.	Date of Membership.	Date of Death.
ERICSSON, JOHN	H. M.	New York City.	Oct. 2, 1879.	Mar. 8, 1889
EVANS, WALTON W.	M. F.	{ New Rochelle, N. Y.	{ M. Dec. 4, 1867. F. Mar. 15, 1870.	{ Nov. 28, 1886
FALCONNET, EUGENE F.	M.	Nashville, Tenn.	June 3, 1874.	Oct. 14, 1887
FARGO, WILLIAM G.	F.	Buffalo, N. Y.	May 6, 1870.	Aug. 4, 1881
FARNHAM, HENRY	F.	Hartford, Conn.	Nov. 14, 1872.	Oct. 4, 1883
FARQUHAR, FRANCIS U.	M.	Corps Engs. U. S. A.	July 10, 1872.	July 3, 1883
FELTON, SAMUEL M.	F.	Philadelphia, Pa.	Mar. 23, 1870.	Jan. 24, 1889
FISHER, CHARLES H.	M.	Lansingburg, N. Y.	July 7, 1869.	Jan. 18, 1888
FLINT, EDWARD A.	M.	Brookline, Mass.	May 18, 1870.	Jan. 23, 1886
FOGG, CHARLES E.	M.	Poughkeepsie, N. Y.	Oct. 16, 1872.	Apr. 26, 1891
FORD, ARTHUR L.	A.	Panama.	Nov. 6, 1872.	May 30, 1880
FORSHEY, CALEB G.	M.	New Orleans, La.	Aug. 7, 1872.	Apr. * 1882
FRENCH, EDMUND	M.	New York City.	Nov. 6, 1872.	May 30, 1880
FOWLER, CHARLES E.	M.	New Haven, Conn.	May 3, 1876.	Jan. 28, 1883
FROST, BENJAMIN D.	M.	North Adams, Mass.	Feb. 21, 1872.	July 19, 1880
GARDINER, EDWARD	M.	New York City.	Nov. 5, 1872.	*
GARDINER, HENRY A.	M.	Jackson, Mich.	Dec. 1, 1852.	July 26, 1875
GILLESPIE, JOSHUA L.	M.	St. Paul, Minn.	{ J. Feb. 3, 1875. M. Apr. 2, 1884.	{ Aug. 20, 1890
GILLIS, JOHN R.	M. F.	New York City.	{ M. June 2, 1869. F. Mar. 15, 1870.	{ July 16, 1870
GILLMORE, QUINCY A.	M.	New York City.	Dec. 2, 1868.	Apr. 7, 1888
GORRINGE, H. H.	A.	New York City.	Apr. 6, 1881.	July 6, 1885
GRAFF, FREDERIC	M.	Philadelphia, Pa.	May 7, 1873.	Mar. 30, 1890
GRAIN, WILLIAM	M.	Fergus, Ont., Can.	Sept. 15, 1869.	Jan. 10, 1877
GRASSAU, H.	M.	New Haven, Conn.	July 6, 1853.	May 16, 1880
GREENE, BENJAMIN H.	M.	Helena, Mont.	May 1, 1878.	Jan. 4, 1890
GREENWOOD, WM. H.	M.	Dummerston, Vt.	Mar. 3, 1880.	Aug. 29, 1880
GRIFFEN, JOHN	M.	Phoenixville, Pa.	Apr. 15, 1868.	Jan. 14, 1884
HADDOCK, ARBA R.	A.	New York City.	May 4, 1881.	Feb. 28, 1885
HALL, G. THOMAS	M.	New York City.	{ A. Oct. 2, 1872. M. Sept. 2, 1874.	{ June 2, 1881
HARBAUGH, SPRINGER	F.	St. Paul, Minn.	May 19, 1871.	Dec. 8, 1887
HARDEE, THOMAS S.	M.	New Orleans, La.	Apr. 4, 1877.	May 20, 1880
HARRIS, HENRIQUE	M.	Brooklyn, N. Y.	Dec. 3, 1879.	Oct. 10, 1882
HASLETT, SULLIVAN	M.	Brooklyn, N. Y.	June 4, 1879.	Jan. 4, 1887
HATFIELD, ROBERT G.	M.	New York City.	Dec. 4, 1867.	Feb. 15, 1879
HAWKSHAW, SIR JOHN	H. M.	London, Eng.	Nov. 3, 1880.	June 2, 1891
HAYWARD, JAMES A.	M.	Galveston, Texas.	Sept. 5, 1877.	Aug. 13, 1880
HILGARD, JULIUS E.	M.	Washington, D. C.	July 10, 1872.	May 8, 1891
HJORTSBERG, MAX	M.	Chicago, Ill.	July 10, 1872.	May 16, 1880
HOE, RICHARD M.	M.	New York City.	Oct. 1, 1873.	June 8, 1886

\* Precise date of death unknown.

Name.	Class.	Residence.	Date of Membership.	Date of Death.
HOLLEY, ALEXANDER L.	M.	Brooklyn, N. Y.	Oct. 1, 1873.	Jan. 29, 1882
HOWELL, CHARLES W.	M.	Corps. Engs. U.S.A.	Mar. 3, 1875.	Apr. 5, 1882
HUMPHREYS, ANDREW A. H.	M.	Corps. Engs. U.S.A.	May 7, 1873.	Dec. 27, 1883
HYDE, WILLIAM B.	M.	Oakland, Cal.	July 12, 1877.	June 1, 1882
JAMES, JOHN C.	M.	Battle Creek, Mich.	Mar. 1, 1876.	Feb. 27, 1883
JERVIS, JOHN B.	H. M.	Rome, N. Y. {	M. Dec. 4, 1867. H.M. Dec. 2, 1868.	{ Jan. 12, 1885
JOHNSON, T. MARR	M.	London, England.	Nov. 16, 1870.	July 31, 1874
JORDAN, GABRIEL	M.	Mobile, Alabama.	Sept. 18, 1872.	Nov. 10, 1884
JUDAH, THEODORE D.	M.	Buffalo, N. Y.	May 4, 1853.	*
KEEFER, SAMUEL	M.	Brockville, Can.	Jan. 6, 1869.	Jan. 7, 1890
KINGSLEY, WILLIAM C.	F.	Brooklyn, N. Y.	June 6, 1870.	Feb. 21, 1885
KIRKWOOD, JAMES P.	M.	Brooklyn, N. Y.	Nov. 2, 1852.	Apr. 22, 1877
KLOMAN, ANDREW	F.	Pittsburgh, Pa.	Jan. 27, 1875.	Dec. 19, 1880
KNIGHT, WILLIAM B.	M.	{ Kansas City, Mo. }	{ J. Jan. 6, 1875. M. Jan. 7, 1880. }	{ Dec. 7, 1890
KRUPP, FREDERICK	F.	Essen, Prussia.	June 14, 1870.	July 14, 1887
LANE, MOSES	M.	Milwaukee, Wis.	Dec. 4, 1867.	Jan. 25, 1882
LATIMER, CHARLES	M.	Cleveland, O.	Apr. 5, 1876.	Mar. 25, 1888
LAURIE, JAMES	M.	Hartford, Conn.	Nov. 5, 1852.	Mar. 15, 1875
LAWLER, JOHN	F.	Prairie du Chien, Wis.	Apr. 28, 1883.	Feb. 23, 1891
LEERS, FRANK A.	M.	Paterson, N. J.	May 4, 1877.	May 19, 1890
LESGE, LOUIS	M.	Montreal, Canada.	Sept. 7, 1881.	Jan. 9, 1889
LEWIS, J. W. P.	M.	Philadelphia, Pa.	Jan. 5, 1853.	*
LOWTHORP, FRANCIS C.	F.	Trenton, N. J.	Mar. 17, 1870.	June 1, 1890
LYON, WILLIAM M.	F.	Pittsburgh, Pa.	Mar. 23, 1870.	July 3, 1889
MACY, ARTHUR	M.	New York City. {	{ J. July 12, 1877. M. Dec. 2, 1885. }	{ Apr. 14, 1891
MAHAN, DENNIS H.	H. M.	West Point, N. Y.	Mar. 2, 1853.	Sept. 16, 1871
MALÉZIEUX, EMIL	H. M.	Paris, France.	Nov. 3, 1880.	May 20, 1885
MARSHALL, CHARLES A.	M.	Johnstown, Pa.	Oct. 1, 1884.	May 31, 1889
MASON, EDDY D.	M. F.	Toledo, Ohio. {	{ M. July 10, 1872. F. Dec. 28, 1872. }	{ Dec. 19, 1874
MCALPINE, CHARLES L.	M.	New York City.	Dec. 4, 1867.	Jan. 11, 1884
MCALPINE, WILLIAM J.	H. M.	{ New Brigh- ton, N. Y. }	{ M. Feb. 3, 1853. H.M. Oct. 26, 1888. }	{ Feb. 16, 1890
MERCUR, FREDERICK	M.	Wilkesbarre, Pa.	July 20, 1870.	Jan. 10, 1888
MERZ, FREDERICK W.	M.	Louisville, Ky.	May 28, 1872.	Dec. * 1883
MICHAELIS, OTHO E.	M.	Augusta, Me.	May 6, 1874.	May 1, 1890
MILLER, SAMUEL H.	M.	Kensington, O.	Sept. 6, 1882.	Mar. 18, 1891
MITCHELL, ALEXANDER	F.	Milwaukee, Wis.	June 13, 1883.	Apr. 19, 1887
MONROE, J. ALBERT	M.	Providence, R. I.	Sept. 15, 1869.	June 11, 1891

Name.	Class.	Residence.	Date of Membership.	Date of Death.
MORLEY, JAMES H.	M.	St. Louis, Mo.	Oct. 6, 1886.	Sept. 11, 1889
MORLEY, WILLIAM R.	M.	Paso del Norte, Mex.	Sept. 6, 1882.	Jan. 12, 1883
MORRELL, WILLIAM II.	M.	New York City.	Nov. 5, 1852.	*
MORRIS, WILLIAM W.	M.	Cincinnati, Ohio.	Jan. 5, 1853.	*
MORSE, JAMES O.	M.	New York City.	Feb. 9, 1853.	Mar. 8, 1883
NEWTON, ISAAC	M.	New York City.	Mar. 3, 1880.	Sept. 25, 1884
NICKERSON, LOUIS H.	M.	Baltimore, Md.	Sept. 18, 1872.	May 6, 1877
OGDEN, WILLIAM B.	F.	New York City.	Mar. 23, 1870.	Aug. 3, 1877
O'SULLIVAN, THOMAS S.	M.	St. Louis, Mo.	Jan. 5, 1853.	Nov. 1, 1855
PAINÉ, WILLIAM H.	M.	New York City.	May 12, 1875.	Dec. 31, 1890
PHILBRICK, EDWARD S.	M.	Boston, Mass.	Sept. 6, 1874.	Feb. 13, 1889
PHILLIPS, WILLIAM	F.	Pittsburgh, Pa.	Mar. 24, 1870.	Apr. 14, 1874
PHINNEY, HENRY W. B.	M.	West Fall Brook, Cal.	Jan. 7, 1885.	Nov. 22, 1888
POINIER, P. PORTER	J.	Cambridge, Mass.	Mar. 3, 1875.	June 11, 1876
POST, SIMEON S.	M.	Jersey City, N. J.	Nov. 5, 1852.	June 29, 1872
PRATT, T. WILLIS	F.	Boston, Mass.	Nov. 4, 1870.	July 17, 1875
PROSSER, THOMAS	M.	New York City.	Dec. 4, 1867.	Sept. 15, 1870
RANDOLPH, JAMES L.	M.	Baltimore, Md.	Mar. 1, 1882.	Sept. 17, 1888
REEVES, SAMUEL J.	M.	Philadelphia, Pa.	Apr. 5, 1868.	Dec. 15, 1878
RENO, JAMES H.	M.	Pittsburgh, Pa.	Nov. 5, 1879.	Aug. 5, 1881
ROBERTS, W. MILNOR	M.	Rio de Janeiro, B'z'l.	Sept. 21, 1870.	July 14, 1881
ROEBLING, JOHN A.	M.	Trenton, N. J.	Dec. 2, 1868.	July 22, 1869
ROGERS, ALBERT B.	M.	Waterville, Wash.	June 6, 1883.	May 4, 1889
ROGERS, JOHN B.	M.	St. Louis, Mo.	July 2, 1873.	Apr. 1, 1874
SCHOTT, C. RIDGELY	M.	New York City.	Apr. 1, 1874.	July 9, 1878
SCHUYLER, HOWARD	M.	San Francisco, Cal.	June 7, 1882.	Dec. 3, 1883
SCOWDEN, THEODORE R.	M.	Cleveland, Ohio.	May 7, 1873.	Dec. 31, 1881
SEELEY, THOMAS J.	M.	Guaymas, Mexico.	Feb. 1, 1882.	Oct. 2, 1883
SEYMOUR, M. T.	F.	New York City.	July 21, 1870.	May 30, 1885
SHELDON, SIMEON	M.	Cleveland, Ohio.	Feb. 5, 1873.	Mar. 4, 1883
SHREVE, SAMUEL H.	M.	New York City.	May 19, 1869.	Nov. 27, 1884
SICKELS, THEOPHILUS E.	M.	New York City.	Feb. 21, 1872.	Feb. 4, 1885
SIDELL, WILLIAM H.	M.	New York City.	Nov. 5, 1852.	July 1, 1873
SITES, WILMON W. C.	M.	Jersey City, N. J.	Nov. 6, 1878.	Oct. 1, 1885
SMITH, CHARLES A.	M.	Newburyport, Mass.	Apr. 7, 1880.	Feb. 2, 1884
SMITH, CHARLES C.	M.	St. Paul, Minn.	July 10, 1872.	Apr. 17, 1889
SMITH, C. SHALER	M.	St. Louis, Mo.	Mar. 5, 1873.	Dec. 19, 1886
SMITH, C. VANDERVOORT	M.	New York City.	July 5, 1876.	June 30, 1884
SPALDING, IRA	M.	New York City.	July 20, 1870.	Oct. 2, 1875

\* Precise date of death unknown.



Name.	Class.	Residence.	Date of Membership.	Date of Death.
SPIELMANN, ARTHUR	M.	Roboken, N.J.	{ A. Mar. 5, 1873. M. Sept. 5, 1877.	{ Nov. 25, 1883
STAHLBERG, ALBERT J.	J.	Copenhagen, Den <sup>k</sup>	Mar. 4, 1874.	Aug. 19, 1887
STEWART, DAVID A.	F.	Pittsburgh, Pa.	Nov. 7, 1872.	Dec. 14, 1888
ST. JOHN, ISAAC M.	M.	Richmond, Va.	July 14, 1871.	Apr. 7, 1880
STRATTON, FRANKLIN A.	M.	Philadelphia, Pa.	May 3, 1876.	July 17, 1879
TALLCOTT, WILLIAM H.	M.	Jersey City, N. J.	Feb. 2, 1853.	Dec. 8, 1868
TASKER, CHARLES A.	J.	Cincinnati, Ohio.	Nov. 4, 1874.	Oct. 4, 1879
TASKER, THOMAS T., Jr.	F.	Philadelphia, Pa.	Jan. 7, 1873.	Aug. 19, 1877
THAW, WILLIAM	F.	Pittsburgh, Pa.	Aug. 30, 1871.	Aug. 17, 1889
THOMPSON, JOHN C.	M.	New York City.	May 18, 1870.	Jan. 17, 1880
TOTTEN, JOSEPH G.	H. M.	Corps Engs. U.S.A.	Mar. 2, 1853.	Apr. 22, 1864
TRACY, EDWARD H.	M.	New York City.	Feb. 19, 1868.	Aug. 28, 1875
TRACY, JOHN F.	F.	New York City.	Jan. 20, 1873.	Feb. 13, 1878
TRAFTON, GILMAN	M.	Louisville, Ky.	Jan. 4, 1871.	May 25, 1887
TYSON, HENRY	M.	Baltimore, Md.	July 10, 1872.	Sept. 1, 1877
VAUGHAN, FREDERIC W.	M.	Louisville, Ky.	Feb. 17, 1869.	Oct. 19, 1887
VINTON, FRANCIS L.	M.	Denver, Colo.	Aug. 5, 1868.	Oct. 6, 1879
WALLING, HENRY F.	M.	Boston, Mass.	May 6, 1868.	Apr. 8, 1888
WALTON, LOUIS R.	M.	Earlington, Ky.	Apr. 1, 1885.	Nov. 9, 1885
WEBER, M. M. B. VON	H. M.	Berlin, Germany.	June 2, 1880.	Apr. 18, 1881
WELCH, ASHBEL	M.	Lambertville, N. J.	Aug. 7, 1872.	Sept. 25, 1882
WELD, F. FLOYD	M.	Waterbury, Conn.	Sept. 3, 1884.	June 28, 1889
WELLS, DANIEL L.	F.	Milwaukee, Wis.	June 13, 1883.	Nov. 24, 1884
WHIPPLE, SQUIRE	H. M.	Albany, N. Y.	May 6, 1868.	Mar. 15, 1888
WHITMAN, THOMAS J.	M.	St. Louis, Mo.	Jan. 29, 1868.	Nov. 26, 1890
WIGHTMAN, HENRY M.	M.	Boston, Mass.	Apr. 2, 1873.	Apr. 3, 1885
WIGHTMAN, WILLARD	M.	Ashland, Ore.	Sept. 5, 1888.	Oct. 29, 1889
WILLIAMS, NORMAN A.	M.	Utica, N. Y.	Feb. 17, 1869.	Oct. 12, 1879
WILLIAMS, WILLIAM	F.	Buffalo, N. Y.	June 16, 1870.	Sept. 10, 1876
WILSON, WILLIAM W.	M.	Yonkers, N. Y.	Jan. 5, 1870.	Feb. 7, 1887
WORTHINGTON, H. R.	M.	New York City.	Jan. 5, 1876.	Dec. 17, 1880
WRIGHT, J. BUTLER	F.	New York City.	May 24, 1870.	Oct. 31, 1877
WRIGHT, WILLIAM W.	M.	Philadelphia, Pa.	Nov. 4, 1872.	Mar. 9, 1882
YORKE, EDWARD	M.	Sacramento, Cal.	Nov. 1, 1882.	May 28, 1884

## GENERAL INFORMATION.

---

**MEETINGS.**—Regular meetings are held at the House of the Society at 20 o'clock on the first and third Wednesday of each month, except July and August. The Annual Meeting for the election of officers and hearing the Annual Reports is held on the third Wednesday in January, beginning at 10 o'clock. A Convention is held annually, at a time and place determined each year by the Society.

The House and Library of the Society are open to Members and visitors introduced by them, from 9 to 17 o'clock each business day except Saturday, when it is closed at 15 o'clock.

**PUBLICATIONS.**—The Transactions and Proceedings of the Society are at present issued in twelve numbers each year. They are furnished to all classes of Members and to persons subscribing \$100 or more to the Building Fund of the Society. They will also be sent to any subscriber at the rate of \$10 per year; and to clubs of ten or more, when ordered through the Secretary of an Engineering or Technical Society or Club, who will be responsible for the payment, at 25 per cent. discount. They may be had with cut or uncut edges, as desired.

**PROFESSIONAL PAPERS.**—The Board of Direction invites professional papers and communications on subjects of engineering interest from all persons, whether Members of the Society or not. These papers and communications will be accepted for publication in the Transactions of the Society, subject to the regular rules prescribed by the Society laws in regard to its publications. These rules provide for a proper editorial supervision, and for the exclusion of old matter readily found elsewhere, of matter specially intended to advocate personal interests, of matter carelessly prepared or contravening established facts, and of matter purely speculative or foreign to the purposes of the Society.

Discussion is also invited from all persons interested in the papers presented to the Society, such discussion to be, of course, subject to the same editorial rules.

**HOUSE OF THE SOCIETY.**—The Society has purchased and now occupies the house No. 127 East 23d street, New York City. The Building Fund has been created to pay for this property.

CONTRIBUTIONS TO THE BUILDING FUND.—By a resolution of the Board of Direction, all contributions to the Building Fund are to be acknowledged, from time to time, by printing lists of the same in the monthly Proceedings of the Society, and in addition to this the names of all those who may subscribe \$100 or more are to be regularly enrolled and published in future lists of the Society under the head of Subscribers to the Building Fund, and they will be entitled to receive one copy of the monthly publications, comprising all papers and transactions of the Society, regularly for life, for each \$100 subscribed by them; such copies to be in addition to those which they may be already entitled to if they are Members or Fellows.

ADDITIONS TO LIBRARY.—It is very desirable that copies of books on engineering subjects, and of reports of municipal, railway, canal, water supply and all other public works, be added to the Library. Members of the Society, and all who feel an interest in the establishment of a library of this character, are asked to secure and send to the Society any such books and reports.

ADMISSION TO MEMBERSHIP.—The members of the Society are, under the Constitution, classified as Members, Associate Members, Associates, Juniors and Fellows. The requisite qualifications for either class will be found in Article II of the Constitution, pages 5 and 6. The provisions as to Honorary Membership are in Article III, page 6.

The form of application for membership will be found on page 16. Information as to fees, dues, commutation of dues, certificates of membership and badge, will be found on page 21.

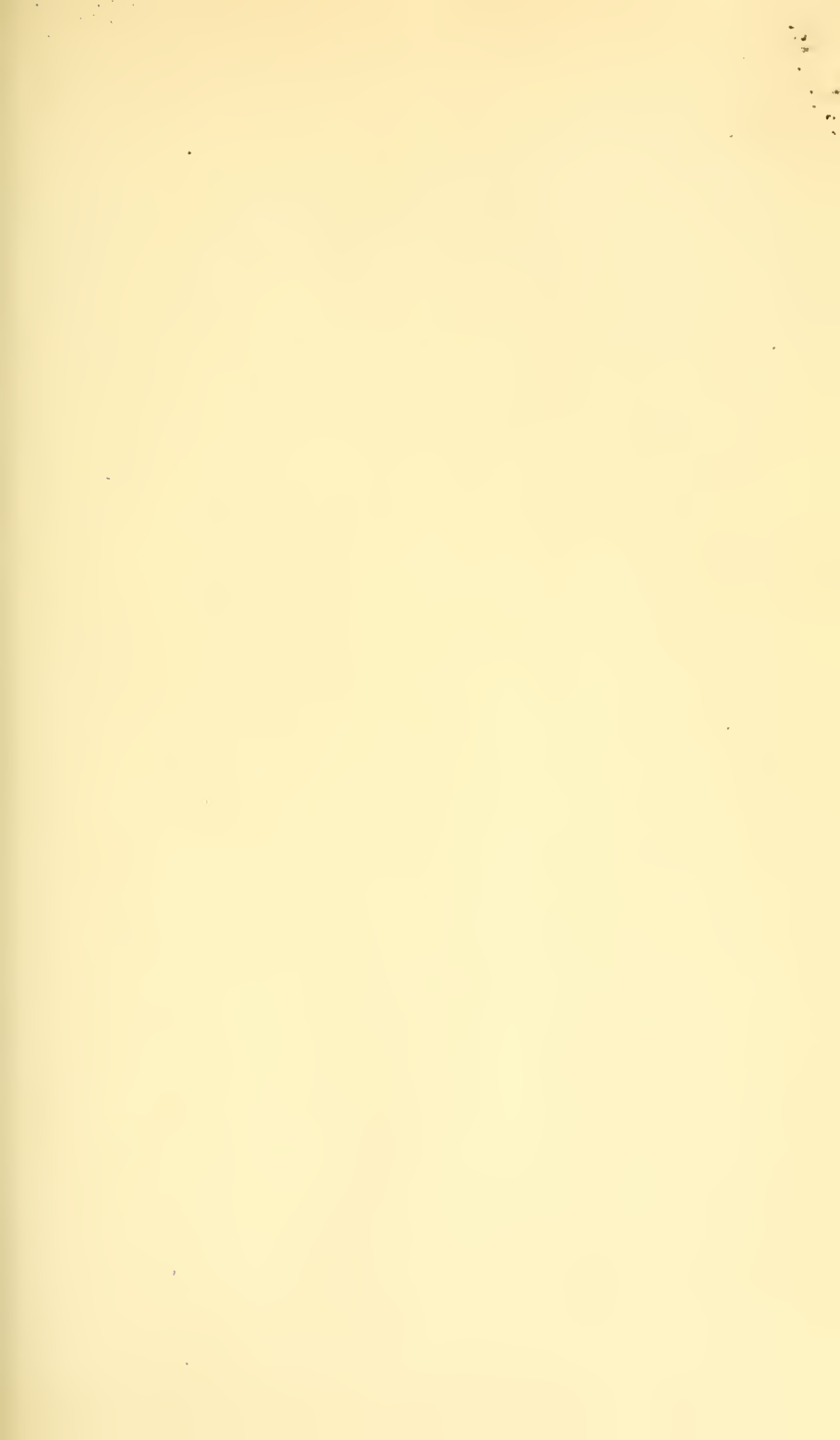
For blank forms and for information, address the Secretary, at the Society House.

REMITTANCE.—All remittances should be made payable to the order of THE AMERICAN SOCIETY OF CIVIL ENGINEERS. They should be in drafts on New York, or in postal money orders, payable at the New York Post Office (not at a branch office).



























NORTHEASTERN UNIVERSITY LIBRARIES



3 9358 00836892 7

110 High St., Boston, Mass.  
No. 9/30/16

BOOKBINDERS

GEORGE COLEMAN CO.



NORTHEASTERN UNIVERSITY LIBRARIES



3 9358 00836892 7